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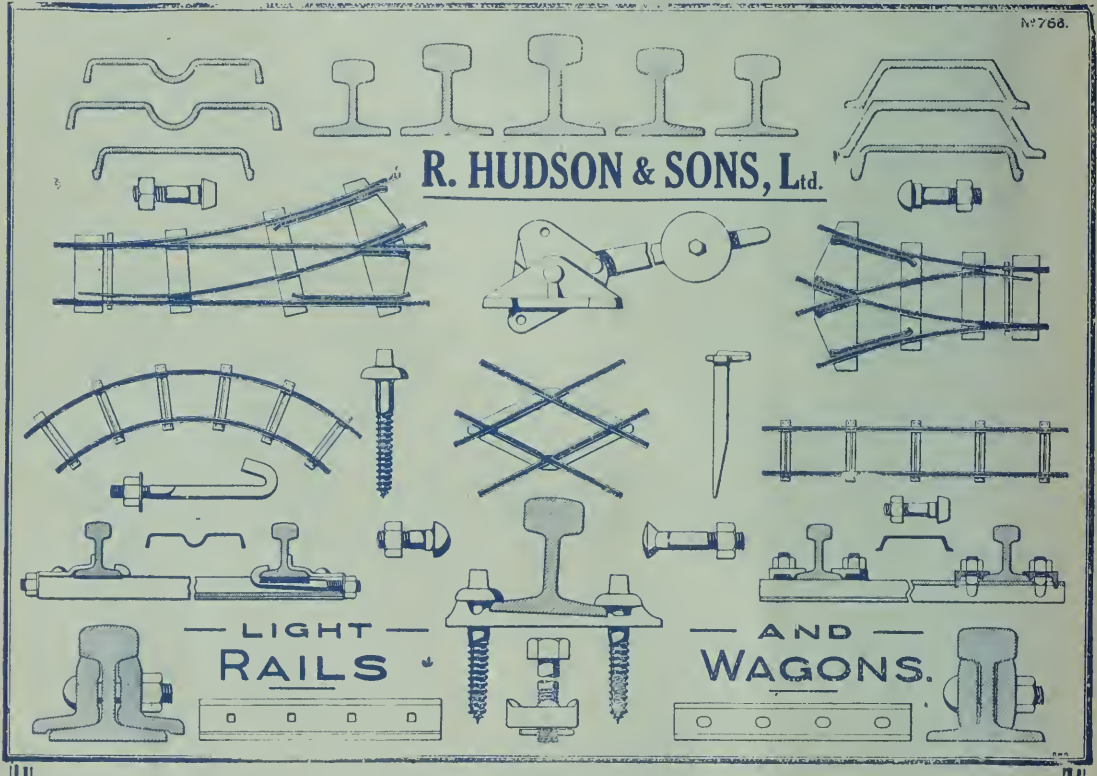

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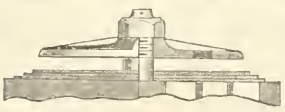

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Notes and News

Springs and Daggafontein.

Dewatering has begun at the Daggafontein property, and it is expected that steady progress will now be made. Increased interest has been taken in the property during the week, and in its stable companion—Spring Mines. Development in the latter is still showing excellent results. Considerable interest has been aroused by the discussion of the question of the options; and it is advisable that holders of the latter should send them in between April 1st and 15th if they want to obviate delay.

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Goldfields Mines' Progress.

The feature of the returns from Goldfields mines for the short month of February is the good showing made by the Simmer Deep and by the Jupiter. The Simmer Deep made a profit of £5,148, which is the best for months, and the Jupiter made £4,533, which is its maximum since operations were re-started. For the shortest month of the year, these improving returns are most noteworthy.

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Standard Bank.

The general manager of the Standard Bank of South Africa, Ltd., is in receipt of cable advice that the directors propose to recommend to shareholders at the general meeting to be held on April 26 next the payment for the half-year ended December 31, 1915, of a dividend at the rate of 14 per cent. per annum, less income tax, making a total distribution of 14 per cent. for 1915. It is further proposed to appropriate £20,000 to the Officers' Pension Fund, to write down investments by £71,000, covering depreciation ascertainable as at December 31 last, to write down bank premises by £15,000, and to carry forward about £87,000.

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The Sakalava Issue.

We are advised that the whole of the 30,000 shares offered to shareholders in the Sakalava Company, and the 20,000 shares offered for public subscription, having been oversubscribed, the application list is now closed.

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Position of the Sheba.

The secretaries favour us with the following description of the position at the Sheba, which has lately been the cause of anxiety to the shareholders: " During the past few months difficulties have been experienced in the course of cyanide treatment," they write, " and recoveries from this source have, in consequence, not been up to expectations. This matter is being especially investigated. Operations during January resulted in a loss of £2,515, after allowing for a sum of £2,047 spent in development. The tonnage crushed was 800 tons, which yielded 1,633oz. of fine gold. The estimated profit for the month of February was £3,750 derived from 6,583 tons crushed, which gave a yield of 2,874ozs. of fine gold. Working costs totalled £6,564, and the amount allowed for development, and included in the cost was £1,400. February tonnage included a larger percentage of free milling ore than was put through during the months previous, and it is not expected that the profit shown for that month will be maintained on the same level.

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Geological Society.

The next monthly meeting of members of the Geological Society will be held in the Council Chamber, Chamber of Mines, Johannesburg, on Monday evening, 13th March, 1916, at 8.15 p.m. The minutes of the ordinary monthly meeting held on the 18th October, 1915, will be read. The following papers will be open for discussion: " The Upper Witwatersrand System, including the Main Reef and associated beds," by E. T. Mellor, D.Sc. (Lond.); " The East Rand," by E. T. Mellor, D.Sc. (Lond.); " The Geology of Part of Namaqualand," by A. W. Rogers, Sc.D. (communicated by permission of the Hon. the Minister of Mines and Industries); " The Dwyka Series in South-West Africa," by P. A. Wagner, D.Eng., D.Sc.: " On the Zinc

and Lead-ore Deposits near Zeerust, Western Transvaal, South Africa," by the late Wm. Anderson, F.R.S.E., etc. communicated by Geo. S. Corstorphine); "Description of a Carbonaceous Mineral occurring in the Witkop Mine, near Zeerust, Transvaal," by C. Anderson, M.A., D.Sc. (Edin.), communicated by Geo. S. Corstorphine). The following paper will be read: "Notes on the Karroo System in the Southern Kalahari," by A. L. du Toit, D.Sc. Mr. J. E. Thomas will exhibit specimens of diamonds from the Simmer Deep Mine, Germiston.

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The Kleinfontein Power Plant.

In connection with the paper to be read before the next meeting of the S.A.I. of E.E. by Mr. Gerard Graham, on Thursday, the 17th inst., entitled "Description of the Plant of the Kleinfontein Power Association," the Board of the Kleinfontein Power Association has extended a cordial invitation to the members of the Institute and lady friends to visit and inspect the Power Station at Benoni on Saturday afternoon, the 18th March. Members intending to go by train should book to Benoni, travelling by the train leaving Johannesburg at 1.15 p.m. and arriving at Benoni at 2.21 p.m. Benoni Station is not more than ten minutes' walk from the Power Plant. At the same time arrangements will be made to provide conveyances for as many as possible from Benoni Station and back again. Trains leave Benoni for the return journey in the direction of Johannesburg at 4.48 and 5.47 p.m. In order to give the Kleinfontein Power Association an idea of the number of visitors, and so that the Railway authorities may be advised if necessary for the number travelling by train, members intending to take part in the visit are requested to notify the secretary of the Institute as early as possible.

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Position of the Bantjes Consolidated.

The profit earned by the Bantjes for the quarter ended the 31st December, 1915, was £1,967 (equal to 7d. per ton milled); total working expenditure, £66,036 (equal to 20s. 6d.); revenue from gold £68,003. A large development footage has been accomplished for the quarter, averaging nearly 1,500 feet per month, as provided for in the policy outlined in the last report; notwithstanding this heavy expenditure a profit of approximately £2,000 was earned. The concentration of development work on the leader foreshadowed in the last quarterly report has been carried on, chiefly from the 10th level downwards, west of the main incline shaft, and has so far resulted in more encouraging values being obtained with an increase in the percentage of payability. The work of driving from the Main Reef West Company into this company's mine on the leader at a vertical depth of about 600 feet below the horizon of the bottom of the Bantjes main incline shaft was commenced in October, and at the close of the year 150 feet had been driven into this company's ground, of which 75 feet was on reef, the value of which is 9·6 dwts. over 40 inches on the leader alone and 9·1 dwts. over 60 inches on the main reef and leader combined. These results are most encouraging, and if they continue as the drive advances the sinking of the incline shaft will be recommenced. The profit outlook for the current quarter is not encouraging. The interim balance sheet shows that the cash on hand, when including the funds provided for shaft-sinking (mine development suspense account), amounts to about £39,200. In view if the reduced profits earned for the year ended 31st December, 1915, and the necessity of conserving funds for development operations, the directors decided not to declare a dividend.

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Geological Survey Reports.

The non-appearance of any report upon the work done by the Geological Survey of the Union during the year 1914, is, of course, due to various difficulties which have arisen in that section of the public service, as in others, as a result of the war. During last year, 1915, comparatively little work was done in the field, we understand, largely in consequence of transport difficulties, so that there seems no reason to suppose that a special report will be issued for that period either. As a matter of fact it is not unlikely that the work of the Survey Department may be somewhat modified as far as publication of results is concerned, seeing that no great disadvantage has arisen from the absence of the usual reports. It will be remembered that the possibility of presenting geological conditions by means of line blocks without colour, as formerly, led to some economy being practised in the matter of the printing bill, much to the disgust of those of us who had been accustomed to appreciate the beauty and general excellence of the coloured maps. In order to economise the rather heavy printing bill a little more, it might be decided to issue reports upon certain areas rather than upon the work done during particular periods. Take, for instance, the geological investigation of the districts in the neighbourhood of the Pongola River, which has been the subject of two reports, and has probably furnished sufficient matter for another equally long. It is possible that a complete monograph upon the whole area so far surveyed would prove more acceptable to those whom the survey is intended to benefit that would the somewhat disjointed sectional reports that are necessary under the existing system. The work could doubtless be done more effectively as a whole than in parts, and the field geologist responsible for it would be able to do more justice to himself at the same time. There is no doubt that the survey of the Witwatersrand that has been made so thoroughly by Dr. Mellor would have gained rather than lost in its quality, if the undertaking had been carried to its completion as a single, unbroken task. In this case, however, the advantages of periodical reports, as far as the public were concerned, outweighed the benefits from a purely scientific standpoint. In most cases this would not necessarily be so, and although no official statement has been made upon the subject, it is, we think, not unlikely that this view may commend itself to the Department in its plans for the future.

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Imperial Income Taxation.

Said the *Pall Mall Gazette* in mail week:—"The Prime Ministers of Australia and New Zealand are now on their way to London, and it is thought that Sir Robert Borden may join in the consultation in London regarding overseas interests. Among the problems likely to be discussed is that of the grievance of double, and even treble income tax payments, which often have to be met by investors who have Colonial and Indian interests. Addressing the Royal Colonial Institute recently, Mr. F. W. Young, the Agent-General for South Australia, spoke well to the point, and showed the injustice of levying income tax twice over on money invested in the Overseas Dominions. A solution, originally proposed by General Botha, finds favour by Mr. Young. It is that the British taxpayer should pay only the difference between the British income tax and the rate in force in the colony. The removal of the headquarters of the Bombay Tramways Company from London, a matter to which we have already referred, has been effected, we believe, in order to avoid the double impost, although Mr. McKenna, replying to a question on the subject, declares that the step may be due to 'considerations other than the incidence of the British income tax.' In knitting up the nation for future eventualities, one of the first questions to be tackled must be that of Imperial taxation as it affects investors throughout our world-wide Empire. Otherwise we shall force taxpayers to place their money in non-British countries."

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Working Depths of Mines.

Mr. G. H. Askew, writing in *Chambers's Journal*, in dealing with this question, refers to the borehole sunk at Schladebach, about 15 miles from Leipzig—one of the deepest holes that has ever been made. The bore was undertaken in making a search for coal, and was 1 mile 117 yards deep, commencing with a diameter of 6in. and finishing at a little more than ½in. The collective weight of the working system of rods was about 20 tons, and not less than 10 hours' hard work was necessary before the crown was raised from the bottom of the hole to the surface. The geological results thus obtained of this exploration of the earth's crust were of very great interest to geologists; but it also

gave more full and definite information about the internal heat of the earth than had ever been obtained by any previous experiment. Capt. Huyssen, the German engineer, who bored this hole, took the temperatures at the various depths with an arrangement by which he could place temporary plugs in the hole at any depth desired. He then determined the temperature of the water (with which the hole was filled) in a short length so plugged above and below that the circulation was stopped, and the water thus confined might be relied upon to indicate the temperature of the strata which held it. These measurements were taken at about every 100ft.—in all there were 58 recorded—so that the measurements should truly indicate the varying temperatures. The readings proved that there was an increase of 1deg. for every 66ft., starting from a depth of 100ft. down to 1¾ miles, and he concludes that the temperature of the rocks all over the earth at a depth of one mile, is 132 degs., and, consequently, at a depth of two miles, 212 degs., or the temperature of boiling water. If this be correct, any water in a pit at this depth will be practically at boiling point, and will give off large quantities of vapour, which will not only keep the roads from being dry and dusty, but will act very deleteriously on the roof, sides and floor; and, combined with the heavy pressures, will make it extremely difficult to support and maintain the roadways. Even if dry heat be encountered, a coal mine would be a veritable powder magazine with both coal and rocks so heated that they could not be touched without scorching the flesh! Moreover, the atmospheric pressure at this depth would be equal to an increase of 850lb. per square foot on all exposed surfaces. In these circumstances, mining operations at a depth of two miles would be distinctly unpleasant. This practical proving of the condition of the earth's interior leads to the conclusion that even if the difficulties of the heat in mines of a depth of two miles could be overcome, the heavy pressures exerted on the rocks and minerals by those superimposed would render it practically impossible to work seams of coal successfully and safely.

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Oceana Consolidated.

The report of the Oceana Consolidated Company, Ltd., for the year ended 30th June, 1915, states that effect has been given to the reduction of capital authorised by the shareholders at the special general meeting held on 7th June, 1915, and sanctioned by the Court on 13th July, 1915, and the balances to the credit of profit and loss account and The figures applicable to the reduction of capital were prepared for presentation to the Court as on 31st March, 1915, appropriation account as on that date were necessarily absorbed in the readjustment of the capital. From 31st March to 30th June a profit of £6,342 accrued, and this balance has been carried forward. No issue of debenture stock has been made, an arrangement having been come to with the company's bankers which obviates the necessity for such issue for the time being. In place of the creation and issue of debenture stock originally contemplated the bankers have accepted temporarily a deed of security under which the company obtains financial facilities for the period of the war and six months thereafter. The advantages of this arrangement are twofold—firstly, a considerable saving in expense, and secondly, although the necessity for the issue of debenture stock may never arise, should an issue ultimately be required it is obviously preferable to fix the terms and price at the time of issue rather than at a time antecedent thereto, when the monetary conditions of the future are an unknown quantity. The directors are pleased to be able to state that the indebtedness to the bankers has not increased since the date of the last extraordinary general meeting, that so far there has been no necessity to make use of the increased borrowing facilities arranged for, and that the company's credit balances have increased. The reduction of the nominal value of the company's issued capital to 5s. per share and the consequent readjustment of asset values have, in the opinion of the directors, placed the valuation of its assets on such a basis as to eliminate the element of depreciation in future, so that accruing profits should be available for distribution.

TOPICS OF THE WEEK.

THE FACTS ABOUT THE FAR EAST RAND.

The idea of an exhaustive compilation of facts about the Far East Rand appears to have been almost a stroke of genius, in view of the increasing public demand for authoritative information about that much discussed district. The report, conceived we know not by whom, prepared by the Government Mining Engineer, assisted, it is understood, by his whole staff of geologists and surveyors, and now to be laid on the Table of an expectant House, promises to aid materially in hastening the development of the district in question. Hitherto, people have had to be content with vague generalisations and globular estimates of the value of the gold in that area. Something more definite is expected as a result of the labours of the Government Mining Engineer. Indeed, had the House of Assembly known how thorough and painstaking had been the labours of Mr. Kotze on the subject, it is doubtful if recourse would have been had to the dilatory expedient of a Select Committee. At any rate, that Committee will have any ground for undue deliberation cut from under its feet by the fact that it has available, in compact form, all the authoritative evidence bearing on the extent of mineral area and peculiarities of the gold occurrence on the Far East Rand. With that at its disposal, the only question that remains to be settled by the Select Committee is the form and method of utilising the Government Areas to the best advantage of the State. As has already been stated in these columns, it is understood that Bills have already been drafted remedying the more glaring defects of the present Gold Law, in so far as they stand in the way of the development of the district. Mynpachts, for instance, must, in fairness, be larger on the comparatively flat bedded area of the Far East. The wisdom of rectifying these anomalies, as an essential preliminary to exploitation—using the word in its best sense—will, it is hoped, be readily admitted by the Select Committee, and steps be taken to facilitate the passing, before the end of the present session, of the remedial measures in question. Parliament must be left under no illusions regarding the vital nature of the matter. The next ten years must see the demise, in the ordinary course of nature, of several important central Rand producers. Some of our deep levels, moreover, are opening up none too favourably in depth, though there are, of course, brilliant exceptions—like the City Deep and Village Deep. Years ago we described the Far East Rand district as "the salvation of the Rand." The description grows less fanciful as the days go by. The contribution of the Far East may be required sooner than many people expect, to maintain the Rand's present standard of production. The Select Committee has before it, therefore, no mere academic question. It is dealing with issues that vitally concern every one of us in the country, living directly or indirectly on the mining industry. The new gold producers of the Rand, the big buying and spending units that are to fill the gaps in the ranks of the gold contributors of today, can come only from the Far East. For that reason, it is to be hoped that the Select Committee will avoid delay, or even the appearance of delay, in removing disabilities, legislative and administrative, that impede the progress of the district.

GENERAL MINING SUBSIDIARIES.

Quiet, but none less real, improvement has been the feature of the General Mining group during recent months. The Cinderella, which is bound to come into its own one of these days, is now engaging the attention of Mr. George Denny, who, it may be recalled, made his name as a successful mining engineer before ever he became associated with the "new metallurgy." Mr. Denny's report on the property will be awaited with interest, and it is possible that its tenour may be such as to bring appreciably nearer the resumption of operations on that mine. Another proof that the group is alive to the significance of developments on the Far East Rand is furnished by the active prospecting that it has been conducting on Reitfontein below the sub-outcrop line of the Main Reef series. Already a borehole has been put down 2,200 feet, the strata encountered being entirely normal Rand formation, giving every promise of revealing at depth the main gold carrier of the district. Drilling nearer the sub-outcrop is expected to prove the existence of the reef at the comparative shallow depth of 800 feet. By the exercise of the options held on the property, the group will then find itself in possession of a big Far East Rand area of great potentiality. Progress, moreover, has been no less marked in respect of the producing mines of the group. The West Rand Consolidated, favoured by the more ample native labour supply available last year, has been enabled to increase its ore reserves as at the end of 1915 by no less than 300,000 tons, appreciably increasing at the same time, the value of the whole as compared with the preceding year. That property now merely awaits the advent of times more propitious to the augmentation of the reduction works to an extent commensurate with its productive capacity. At the Aurora West a complete and silent transformation has been effected with the surface equipment. Towards the close of last year a change over was successfully accomplished to a new incline shaft, headgear and winding engine; and several less important improvements have since been added. A steady reduction of the debt on this company has been made during the year, and it is now unlikely that any alteration in the capital will be found necessary. The feature at the Meyer and Charlton is the improvement in the ventilation of the mine, due to the increased study given to the matter; and the effect on working costs and efficiency should be entirely favourable. The Van Ryn pursues its steady, profitable way, and towards the close of last year exhibited better returns, due to a higher yield per ton crushed. Last, but most noteworthy of all, is the case of the Roodepoort United. The recent change in the fortunes of that company may almost be described as sensational. Despite the dismal forebodings of the faint-hearted, the mine has steadily recovered itself, and to-day is able to show gradually improving profits, and greatly strengthened ore reserves. In the deeper levels the values of the ore opened up are better; and the percentage of "payable" to unpayable ore exposed has, likewise, increased. Moreover, not only are values higher but the formation in depth is more regular; and the latest developments give reason to hope that not the Roodepoort United alone, but the whole district may regain its reputation with further exploitation in depth. The company is, of course, still indebted to the parent house, which so liberally financed it through the dark days; but with profits now on the up-grade, and these present profits being won not from the richer ground recently opened up, but from the more careful mining of the older stopes, there is reason to believe that the company may, in time, be raised, equally from the financial and the mining point of view, to a satisfactory position. The forthcoming annual reports will, doubtless, provide a wealth of detail regarding these developments. In the meantime, however, we may be permitted this brief appreciation of the progress made and good work done on the mines of the group, to which all too little attention has of late been given.

A NEW EAST RAND MAP.

We have received from Mr. W. E. Bleloch, the compiler, a copy of a new map, which he has published, together with a copy of a report by Mr. W. T. Hallimond, upon the geological features and prospects of the Southern Van Ryn Reef Gold Mining Company, Ltd. The object of the map and of the report is obviously to establish the theory that the Van Ryn reef, as worked in the Van Ryn, New Modder, and other adjacent mines, and the Nigel, as mined upon the property of that name, are two distinct beds of conglomerate, and, further, that each is to be found underlying the claims of the Southern Van Ryn Company at easily accessible depths. The geological sequence is outlined by Mr. Hallimond thus, from below upwards:—Tatham Reef, with shale hanging wall; Nigel Reef, with shale footwall and quartzite hanging wall; Van Ryn Reef, with shale footwall and quartzite hanging wall. It is well known, of course, that this theory of Mr. Bleloch is not generally accepted, and it is interesting to follow the line of argument laid down by Mr. Hallimond, who claims to have a long and extensive acquaintance with the district in question, and has, moreover, made a careful examination of all the available geological evidence to date. His opinion, therefore, is entitled to carry some weight. At the same time, we must confess that we are unable to accept his evidence as altogether conclusive. He points out that there is no similarity in the nature of the Nigel and Van Ryn bankets, and asserts that the different nature of the footwall shales in each case constitutes very strong evidence that these reefs cannot be classed as the same. To this, of course, it may reasonably be objected that it is scarcely safe to make a correlation by means of hand specimens taken at places as far apart as Benoni, say, and Heidelberg, especially when it is a matter of common knowledge that the Witwatersrand system shows a notable change in the thickness and physical character of its component beds in that neighbourhood and over that distance. An additional item of evidence, upon which strong emphasis is placed, is that of the Tatham Reef which is said to possess very distinctive features as a banket, and in addition to this has the almost unique feature of a shale hanging wall. The Tatham Reef takes its name from the fact that it is found in a shaft on some ground known as Tatham's claims, just north of the Van Ryn boundary. The difficulty about this occurrence, as an element of evidence, is that apart from its reported existence on Vlakfontein, and near the Nigel mine, it is only known to be exposed in this particular shaft. How it got there, or how it is associated with the adjoining Van Ryn, or any other, horizon, is unknown. The correlation of this fragment with other similar ones some miles to the south-east is too uncertain, we think, to permit of its being regarded as "a very definite marker." It is, nevertheless, a matter that deserves to be investigated more extensively. In his map, Mr. Bleloch shows the Nigel Reef as running parallel and adjacent to the Tatham Reef, around the Kleinfontein-Van Ryn bend, and right across the deep railway cutting, which affords such interesting stratigraphical exposures on the eastern side of the Van Ryn plantation. He claims to have actually found the reef in this excavation, although we do not remember to have seen anything there which might be said to correspond with it. In view of the fact that the conglomerates tend to diminish in persistence and thickness towards the south-east one would have expected to find the Nigel Reef, if present, to be quite distinctly in evidence in this cutting. This point is not referred to by Mr. Hallimond, who is apparently in agreement with Mr. Bleloch, however, as far as the Van Ryn section generally is concerned. Whatever the actual truth may be with regard to Mr. Bleloch's theory of the Van Ryn as a distinct reef from the Nigel, it is, of course, admitted that his borehole No. 3 has proved the existence of the latter body. From this point of view the ground of the Southern Van Ryn Reef Company, Ltd., has attractive possibilities.

FUTURE PRODUCERS OF THE FAR EAST RAND.—I. RAND KLIP.

The Prospects Reviewed—Improved Returns in Depth—Lessons from Neighbouring Properties—Last Official Report Recalled—Fringe of a Payable Patch?—Large Claim Area.

Of the Far East properties that are coming in for a daily growing share of attention as the future producers of the industry, the Rand Klip is one of the most promising. It differs from most of its neighbours in that considerable development has already been done, and there is no reason to doubt that further development will prove highly profitable. The best official account of the position and prospects of the property is contained in the chairman's speech at the last annual meeting, which was held a few months ago. On that occasion, Colonel Dalrymple said, *inter alia*:—

I may perhaps review the development work which has already been done on your property. As the early prospecting along the outcrop proved very disappointing, both in widths and values, the board had to endeavour to ascertain whether the reef made in width and value at depth, consequently the position of the mynpacht was decided upon after a methodical policy of diamond drilling had been carried out, and it is needless to say the site was eventually chosen on the best indications obtained as regards widths and values of the reef at the points of intersection. Two five-compartment vertical shafts were started. Of these, one—the west shaft—was sunk to a depth of 555 feet, and then stopped to allow of the concentration of the available cash working capital and labour force on the east shaft. This shaft encountered the reef at a depth of 1,792 feet 6 inches, and six drive faces and several winzes were being advanced at the date of closing down. The west shaft, however, has still some 1,300 feet to be sunk, but this should be straight-forward work as the bad ground which so delayed our early operations had, in our opinion, been successfully passed through and secured previous to closing down. On the whole, I think we may safely say that the position is such that, when we reopen, we can develop our large holding fairly rapidly, and without undue delay. When the mine was closed down, 2,409 feet of shaft sinking had been completed, and footage to the extent of 6,177 feet had been driven, risen and sunk, of which 4,395 feet were on reef, and the average value of the reef exposures were 4.6 dwts. over 21.7 inches. The values encountered on the third or lowest level of the mine showed considerable improvement on results from the upper levels, the 235 feet sampled giving an average assay value of 8.4 dwts. over 27.4 inches. Owing to the approaching exhaustion of working capital, all development work was suspended on the 31st of March, 1913. The total area prospected to the date of closing down amounted to some 20 claims or approximately 2 per cent. of the mynpacht area to which your company would be entitled on proclamation of the farm. That is practically the whole of the information that we are able to give you with regard to the values that have been actually encountered in the work of development round about the eastern shaft of your property.

SURROUNDING PROPERTIES.

The workings of our newest neighbours on the strike—the Modder B—are still some one and a quarter miles from our boundary, and moreover, they are separated from us by a block of Government ground of about 600 claims. The same position applies to the nearest working property on our dip, the Geduld, where the workings are also about one and a quarter miles distant, with the Cloverfield property intervening. We cannot, therefore, attach any direct importance to the values being disclosed by the workings of these properties, as they proceed in our direction, but it is nevertheless gratifying to note that most encouraging results have been obtained from them. While we are not in a position to make any deductions from the values obtained in the nearest development points to us, I do think we can draw great encouragement from the general results obtained from the whole of this Far East Rand district, in which our mine is situated. We find those companies which are actually working have, during the last two or three years, enormously increased the value of their properties, by systematic and straight-forward development, and those who are acquainted with the occurrence of values in this particular area, know that there is no system of pay-shoots to be followed, but that patches, often covering large areas, must be searched for. There is no reason to believe, from actual information obtained, that your property should not average in the matter of value something in proximity to its neighbours. The values which were disclosed by the small amount of development done on the third level in the eastern section tend to show that we may have been on the fringe of one of the payable patches to which I have referred, when our financial position forced us to close down operations. The local conditions, of course, necessitate a large claim-holding—that we have got. It will therefore be patent to shareholders that the possibility of success only lies in the provision of ample funds for thorough development on a large scale. When normal conditions are restored, I feel sure we shall have a good case to present when endeavouring to obtain the guarantees necessary to raise the amount required, especially when the potentialities of this district are fully realised. Meanwhile, the property is being well maintained, and all plant and machinery kept in good order; and the revenue received a little more than meets the expenditure, therefore your capital cash reserve is not at present being encroached upon.

At the annual meeting in 1914, Col. Dalrymple said: "The results obtained by neighbouring companies in the course of their development indicate that your property is in an area which holds out great promise. While the initial development on the 1st and 2nd levels of your mine was, unfortunately, disappointing, it is characteristic of all the mines of the Far East Rand district that comparatively large unpayable sections are encountered, alternating with highly payable areas. Judging, however, by the value obtained on your lowest level (8.4 dwt. over 27.4 inches), there is the indication that we were probably getting on to one of the payable areas, when, owing to the company's financial position, we were forced to suspend work."

It may be added that the capital is £650,000 in £1 shares, of which 132,336 shares have been issued. The mynpacht area is equal to about 1,000 claims.

Transvaal G.M. Estates.

The quarterly report of the directors of the Transvaal Gold Mining Estates announces that the unskilled labour position has gradually improved. This has enabled the company to undertake a good deal more prospecting and development work whilst a slightly increased tonnage has been dealt with in the mill. Working costs have increased owing to the war and to the increased amount spent on development and prospecting. The drop in profits is partly attributable to these factors, but chiefly to the falling-off in grade of ore mined, which has been marked, especially in the Peach Tree-Duke's Hill section, whence the Central Mill derives the greater portion of its rock. Development values in this section have been most discouraging, and unless better values are disclosed in the near future, the grade of ore milled must continue at a low level. At the Central Mines the lower grade mainly accounted for a drop in profit of £11,943 for the quarter, the total fall in profit being £11,659 over all the mines, of which £2,856 represent additional realisation charges on gold due to the war in respect of the period October, 1914, to September, 1915. The working costs over all mines were 10'9d. per ton milled higher. There is, as yet, nothing definite of a payable nature to report from any of the prospecting work. As the unskilled labour position improved, considerably increased activity was shown in prospecting. A number of fresh points of attack were started up, but the work on Goedverwacht was stopped owing to the unsatisfactory results obtained, and Dark's Gulley work has been temporarily suspended. On Finsbury No. 621 considerable alluvial washing is in progress. Central Mines: In the Duke's Hill South Mine development results have been most unsatisfactory with as yet no indications of any improvement. At the Peach Tree Mine development has also been unpayable. The Iota Section has been coupled up with the Peach Tree tramway system. In the Theta Mine development results have been satisfactory. At Theta Extension development values have improved again. The reclamation work at the Graskop Mine has progressed well—the sections of the mine lost at the time of the floods having been satisfactorily re-opened. At Brown's Hill development has given fair results, and the tramway connection with the Peach Tree system is now in working order. Elandsdrift: The additional five stamps and cyanide plant were brought into commission and are working satisfactorily. Water has continued to hamper development work in the mine, but every effort is being made so that this matter can be dealt with, and it is anticipated that an improved rate of profits will be maintained. Vaalhoek: The new tube mill and accessory plant were completed and thrown into commission, and are running satisfactorily. The water trouble in the river section has been severe; the work of development and also winning of rock for the mill from this section being much hampered thereby.

THE YEAR WITH THE NEW HERIOT.

Record Tonnage Milled—Value of Reclamation Work—Outlook Satisfactory.

In his report upon the operations of the New Heriot for the year ended 31st December, 1915, the Manager, Mr. H. Warren, writes *inter alia*:—Mine.—The underground operations comprised the following: Stoping, etc.—Stoping was carried on throughout the mine, resulting in a total of 188,900 tons, to which must be added the ore obtained from developing faces, making a total of 191,953 tons mined, of which 3,548 tons (1·8 per cent.) were from the North Reef; 27,136 tons (14·2 per cent.) were from the Main Reef; 55,520 tons (28·9 per cent.) were from the Main Reef Leader; 105,749 tons (55·1 per cent.) were from the South Reef. The stoping width in these reefs averaged respectively 44 inches, 54 inches, 43 inches, and 52 inches. Development Work.—The development operations resulted in the following footages: Drives, 743ft.; winzes and raises, 434 ft.; cross-cuts, 296ft.; total, 1,473ft. Of the above footage, 1,140ft., or about 77·4 per cent., was in reef formation, the reef disclosures in which were as follows: Main Reef Leader, distance exposed, 613ft., width 24ins., assay value, 81s. 6d.; South Reef, distance exposed, 527ft.; width 24ins., assay value, 69s. 3d. The estimated tonnage of payable ore exposed by drives and stoping in undeveloped ground was as follows:—Main Reef, 4,946 tons; Main Reef Leader, 28,397 tons; South Reef, 22,502 tons; total, 55,845 tons. Ore Reserves.—The developed payable ore reserves including shaft pillars at 31st December, 1915, were estimated as follows:—Main Reef, 86,205 tons, value 6·4 dwts.; Main Reef Leader, 283,362 tons, value, 8·0 dwts.; South Reef, 167,113 tons, value, 8·6 dwts.; total, 536,680 tons, value, 8·0 dwts. General.—Development: 1,473ft. were driven, developing 55,845 tons, as against 73,752 tons for the previous year, a decrease of 17,907 tons. Mining.—The tonnage mined was 191,953, as against 184,032, an increase of 7,921 tons. Reclamation.—The exploitation of the upper levels has been continued as expeditiously as conditions would permit, resulting in 58,677 tons, or 30·6 per cent. of the total ore mined being obtained from this source. Ore reserves.—The developed payable ore reserves are estimated at 536,680 tons, of an average value of 8 dwts., as against 588,315 tons, of an average value of 8·1 dwts., as at 31st December, 1914. Revenue, Expenditure and Profit.—Compared with the previous year, there was a total decrease in revenue of £2,275, an increase in costs of £8,168, resulting in a decrease in profit of £10,443. The following are the particulars per ton milled for the years 1912, 1913, 1914 and 1915:—Revenue, per ton milled: 1912, 37s. 1·6d.; 1913, 34s. 7·9d.; 1914, 36s. 6·5d.; 1915, 35s. 11·1d. Expenditure, per ton milled: 1912, 21s. 11·7d.; 1913, 22s. 9·3d.; 1914, 20s. 11·2d.; 1915, 21s. 9·6d. Profit per ton milled: 1912, 15s. 1·9d.; 1913, 11s. 10·6d.; 1914, 15s. 7·3d.; 1915, 14s. 1·5d. Plant and Machinery.—The plant and machinery are in good running order, and have been well maintained during the year. The renovation of the mill, referred to in the report for 1914, was completed. It was found necessary to renew the whole structure of the original 40 stamps, and to put in concrete foundations for the mortar boxes. The efficiency of the mill has been improved by this renovation, the duty per stamp for the year being 7·744 tons as against 6·893. With this increased efficiency it is not necessary to run more than 60 stamps to deal with the tonnage from the mine. Abnormal expenditure was also incurred as follows: The removal of the 7th level pump which was erected temporarily to cope with the flood water in the mine in November, 1913. This was re-erected on a permanent foundation, and a large sump excavated. In accordance with the Mining Regulations the necessary plant was installed for the spraying of the sands dump with a black earth solution to prevent the blowing of dust. The total of this abnormal expenditure amounted to £3,878, the particulars being as follows:—Mill renovation, £2,794; sand dump spraying, £204; mine pump and sump, £450; surface culverts and drainage, £430; total, £3,878. Pumping.—The water in the mine increased considerably in December, 1914, and remained excessive throughout 1915; 127,032,795 gallons were pumped from the mine compared with 58,808,261 in the previous year, being an increase of 73,224,534 gallons, or 136 per cent. No difficulty was experienced with this water. Labour.—The labour force throughout the year has been satisfactory. There were employed 142 whites and 1,377 coloured per month, as against 136 white and 1,262 coloured for the previous year. General.—The excess in costs of stores consumed during the year, owing to the war conditions, has varied between 6 and 8 per cent., entailing an increase of £4,312, the expenditure on account of Hospital Ship and men on active service was £932, making together an expenditure, due to the war, of £5,244. If allowance is made for this and the abnormal expenditure previously mentioned, in all £9,122, the results for the year may be considered very satisfactory, closely approximating the returns of the previous year. It may reasonably be anticipated that satisfactory profits will be realised during the current year.

The Consulting Engineer, Mr. H. Stuart Martin, writes: The profit for the year amounted to £109,881 from 155,600 tons milled, a satisfactory result, seeing that working expenditure bore a sum of £9,122, which can be regarded as abnormal. The renovations to the battery were successfully carried out without interfering with current production; in fact, a record tonnage was milled and the plant is now in every way more efficient and is capable of crushing 13,500 tons a month. The total cost of renovation has amounted to £2,794, and has been a direct charge to current operating costs. The re-opening of old levels in the upper workings has made good progress during the year, and of the total ore mined 30·6 per cent. was obtained by reclamation work in these localities. There is every indication that a similar proportion of the output can be obtained in reclaiming old workings for several years. This class of work has been handled in a skilful manner, and the greatest care has been taken to sort out waste rock in situ so that the mill product has consisted as nearly as possible of clean reef. The total development footage amounted to 1,473 feet, practically all in the South Western section of the mine. Very little more work will be required to fully develop this area. The ore reserve, re-estimated at December 31st, 1915, is as follows:—Main Reef: 86,205 tons; value, 6·4 dwts., 26s. 10d.; stoping width, 82ins. Main Reef Leader: 283,362 tons; value, 8·0 dwts., 33s. 7d.; stoping width, 44ins. South Reef: 167,113 tons; value, 8·6 dwts., 36s. 1d.; stoping width, 47ins. Total, 536,680 tons; value, 8·0 dwts., 33s. 7d. Compared with the preceding year there is a decrease of 51,635 tons. Generally speaking, the property both underground and on the surface has received many additions and improvements. There has been no expenditure on capital account. The prospects for the current year are satisfactory. The management and staff are to be congratulated on the results of their handling of your property.

Utilising Mine Dumps.

The market report issued by the Department of Agriculture on February 10th records the following matter, which should interest local mines:—"Although not strictly a market item, I should like to mention that chemical and other tests have recently been made in London with material from the dumps in Johannesburg, and a few days ago specimens of the pottery made therefrom were submitted to me for inspection. Without expressing any opinion as to the quality or value of the articles shown, they were interesting as showing that the 'dump' can be converted into a fairly hard substance which might perhaps be used for roads, drain pipes, roofing tiles, floors, and perhaps low grade pottery. I was informed that the dump used in the experiments was obtained a few months ago from Johannesburg, and that the other ingredients entering into the composition of the specimens shown are also to be found in abundance in the Union. A practical test of the discovery on a more extended scale is, I understand, to be carried out shortly on the spot."

THE LIFE OF THE CITY AND SUBURBAN.

Chairman's Latest Statement Read in Light of Explanation Issued Last Year.

THE "life" question is, of course, all-important in the case of a mine like the City and Suburban. At the annual meeting last week the Chairman said:—"During the early part of last year several enquiries were made of the Board concerning the life of the mine, and certain comments were made thereon in the Johannesburg mining press. In consequence thereof the Board requested the consulting engineer and the manager to go fully into the question and report. Immediately on receipt of such report its contents were embodied in a circular which was issued to every shareholder on the 14th July, 1915. This report was of a very comprehensive character and we received the thanks of many shareholders for its publication. I have now to report that the Government Mining Department has made a further re-calculation of the life of the mine, and has set it down at seven years from the 1st January, 1915, and this, after consultation with our technical advisers, has been agreed to by the Board." It may be well to quote some extracts from the statement issued last July, compiled by the consulting engineer and manager, which was submitted for the information of shareholders.

"Ore reserves at 31st December, 1914: Main Reef Leader, 629,500 tons, value 8.8 dwts., stope width 50in.; South Reef, 129,200 tons, value 7.1 dwts., stope width 49in. Total, 758,700 tons, value 8.5 dwts. While the value of the ore reserves can be estimated with reasonable accuracy, it need hardly be said that anything outside of these has to be assumed on less detailed information. The general knowledge of our mine and the surrounding properties, however, enables us to submit the following estimate to the further ore contents of the mine, which we believe will prove to be conservative. Estimated additional payable tonnage to be recovered at the above date from existing workings, being Main Reef in existing known areas, South Reef and Leader from old working in the upper levels, and ore, mostly Leader, from areas excluded from the existing ore reserves or undeveloped in the upper levels: 190,000 tons, value 5.8 dwts. In the undeveloped portion of the mine it is estimated that over 740,000 tons of payable Main Reef Leader will be exposed, giving a value of 8.9 dwts. over 55 inches. This makes a total of about 1,690,000 mining tons of an average value but little less than that of the present ore reserves. Allowing for tonnage to be sorted, this gives a life, at the present rate of crushing, of just under five years from 1st January, 1915, but in practice the full crushing capacity could not be maintained throughout the period owing to the reduced number of points of attack towards the close. No allowance is made in the above figures for the exposure of any further payable Main Reef or South Reef. Any increase in the stoping widths beyond those now assumed in the ground yet to be developed, or the discovery of further Main Reef or South Reef therein, or a drop in working costs followed by the mining of more ore from the existing excluded areas, would all add materially to the life. Further no allowance is made in the above estimates for the additional 2.7 City Deep claims over which the Company holds an option—an option which it is morally certain will be exercised in due course. Bearing these points in mind, and also the fact that, as shown in the cleaning up of all old mines in these fields, the tonnage existing is almost invariably greater than that which can be calculated on in advance, it is reasonable to suppose that the mine will continue active operations for quite seven years, although during the latter part of that period the rate of crushing will gradually be decreased."

Simmer and Jack v. S.A.R.

It is understood that the Railway Board has decided to apply to the Privy Council for special leave to appeal from the decision of the Appellate Division of the Supreme Court delivered on May 11, 1915, in the Simmer and Jack Proprietary Mines, Ltd., v. South African Railways and Harbours of the Union. The main point in issue is the right of the company to undermine the railway lands that were expropriated by the Transvaal Republican Government for the Netherlands Railway Company's Rand tram in 1889, and its liability to fill in excavations under the railway so as to avoid subsidence; the cross-appeal raised the point as to the authority of the Inspector of Mines to order a mine-owner to pack excavations under a railway or other surface structure and so make it safe. In the Appellate Division Sir James Rose-Innes and Sir William Solomon held in favour of the company, and the Hon. J. de Villiers differed from them, and found that the Railway's contention was correct. The legal questions involved are of great importance to the mining community, and the result will be watched with interest.

Main Reef West.

The report for the quarter ended 31st December, 1915, shows, *inter alia*, that the total working costs were £71,988 5s., or 18s. 7·972d. per ton milled; profit for quarter, £11,836 10s. 2d., or 3s. 0·826d. per ton milled. revenue, £83,824 15s. 2d., or 21s. 8·798d. per ton milled. (Note.—No allowance has been made in the above statement for interest on debentures, or for the Government tax on profits.) The capital expenditure was as follows:—Shafts, £3,453 14s. 6d.; buildings, machinery and plant, £204 9s. 10d.; total, £3,658 4s. 4d. Milling: Stamps running, 110; time run, 81·07 days; three tube mills ran 83·79 days; tons crushed, 77,140; duty per stamp per day, 8·473 tons; yield in fine gold, 14,733·908 ozs.; yield in fine gold per ton crushed, 3·820 dwts. Cyaniding (sand and slimes): Sands treated, 43,120 tons; slimes treated, 34,020 tons; yield in fine gold, 5,434·994 ozs.; yield in fine gold per ton crushed, 1·409 dwts.; cost per ton treated, 1s. 3·699d.; recovered from all sources employed per ton milled (fine gold), 5·229 dwts. Development: Drives and crosscuts, 1,459 ft.; raises and winzes, 1,577½ ft.; other crosscuts and prospecting work, 349 ft.; ore passes, 80½ ft.; stations, 68 ft.; shafts, 78 ft.; shaft raise, 17 ft.; total, 3,629 ft. Assay values: Excluding stations, shafts and shaft raise, other crosscuts and prospecting work and ore passes, 2,353½ feet, or 77·5 per cent., have been on reef, of which 2,342½ feet have been sampled. Of this 1,087½ feet, or 46·4 per cent., have been payable of an average value of 7·5 dwts. over 50 inches; and 1,255 feet, or 53·6 per cent., have been unpayable of an average value of 3·6 dwts. over 49 inches. All the footage was done on Main Reef Leader. Ore reserves: Ore reserves, 30th September, 1915, 406,380 tons; ore developed for quarter, 32,360 tons; less ore mined for quarter, 86,901 tons; less reclamation, etc., 25,871 tons; ore reserves, 31st December, 1915, 377,710 tons. Mining: Ore mined for the quarter, 86,901 tons; less waste sorted out (11·12 per cent.), 9,661; difference in bins, 100; ore milled for the quarter, 77,140 tons.

S.W. Transvaal Diamond Diggings.

The returns of diamonds found in the alluvial fields of the South-Western Transvaal during the month of January show a total of 2,486¼ carats, valued at £11,818 7s., which is less than any month since August last. There were 38 different producing areas, the chief of which were as follows:

	Carats.	Value.
London	414¾	£2,048 15 0
Bloemhof	424	1,822 17 6
Dievedraai	343¾	1,589 12 6
Kafferspan	236	1,390 10 0
Goedehoop	101½	698 15 0
Cawood's Hope ...	84½	461 2 6
Kameelkuil	99¾	457 0 0
Koppiesvlei	105¾	446 18 6
Klipkuil	78¾	310 7 6
Mooifontein	80¾	308 7 6
Christiana	59	299 7 6
Panfontein	59¾	290 2 6
Mamusa	62¾	282 15 0
Eastleigh	43¼	226 15 0
Zwartlaagte	46¾	190 3 6
Zevenfontein	44¼	188 5 0
Modderkraal	27	160 0 0
Kromellenboog	26	137 2 6

SOUTH AFRICA AND THE DEMAND FOR NICKEL.

An Opportunity for Local Enterprise—Ore Deposits of the Insizwa Range—The Metal Production Movement Within the Empire.

A FEW weeks ago a question was asked in the House of Commons as to whether the Government were acting in conjunction with the Dominion Government and the authorities in Ontario to prevent the manipulation by foreign influence of the nickel deposits in that State. Something is being done in this direction, it seems, for a report upon the subject is being prepared for the Home Government by Mr. G. T. Holloway, of London, a metallurgist who is an acknowledged authority upon the subject. In view of this movement, and of the demand for nickel generally, it appears to be an opportune time to draw attention to the occurrences in East Griqualand, along the Insizwa Range. There ores of copper and nickel (chalcopyrite and pentlandite with pyrrhotite) are found disseminated, through the basal portion of a gigantic and extensive sill of gabbro, in a number of localities along a contact with hornfels, but principally in the Insizwa mining area. The sulphides form veins and lenses of considerable richness in places, but the actual ore body, if worked, would be a gabbro containing sulphides, it is said, to the amount of about 5 or 6 per cent. It is, therefore, a low grade proposition, as far as existing evidence goes, but further exploratory work might reveal more favourable conditions. Since the quantity of mineralized rock is very large, mining operations should be proportionately low, and in this way the fact of low grade might be compensated for. Assays are reported as showing copper to be slightly in excess of nickel, but the latter is of twice the commercial value as compared with the former class of ore. There are small accessory amounts of platinum and gold.

MAIN SOURCE OF NICKEL SUPPLY.

The United States may be regarded as the greatest producer of nickel in the world, but the metal is not obtained from domestic sources. The raw materials are obtained mainly from Canada and New Caledonia. The ores from New Caledonia, which is the only serious competitor of the Ontario producing deposits in Canada, are richer, but by reason of the nature of the ores and their location the profit obtained is smaller than that from the Sudbury district, which is the centre of the nickel industry of Ontario. The mines in the Sudbury district are of great extent and value, and the ore is a pyrrhotite, carrying the nickel mineral pentlandite and also chalcopyrite. In contents it varies from 1·5 to 5 per cent. in both nickel and copper, but the latter metal is usually somewhat lower in proportion. A fair average of the ores as raised is said to be, say, 3·5 per cent. nickel and 2 per cent. copper. The deposits occur in lenticular masses on the outer edges of a huge laccolithie sheet which surrounds an area about 35 miles long and 17 miles wide. In many respects the Insizwa occurrence is comparable with that of Sudbury, and further investigation of the Cape deposit might be worth while carrying out. To show the rapid way in which the nickel industry of Canada has been developed during recent years, it may be remarked that while the production of the metal in 1911 was 17,049 tons, in 1914 it was 22,759 tons, and is estimated to have been 32,000 tons in 1915. The increased production during the last twelve months has, of course, been fostered by demands for war material, but in any event the market for nickel will probable be suffieiently attractive after the war, particularly in view of the fact that a movement is in progress to encourage the working and treatment of metals within the Empire. Australasia is taking a prominent part in this movement, together with Canada; South Africa, true to its policy of relying upon outside assistance, is waiting to see what turns up.

CAPE DIAMOND OUTPUT.

Returns for January.

The following is a statement of the output of diamonds from the public diggings in the Cape Province for the month of January, 1916:—

BARKLY WEST DISTRICT.

Area.	No. of diggers.	Carats.	Value.
Bad Hope	2	4¾	£16 10 0
Delport's Hope	39	308	1,749 7 6
Elandsdrift	1	3	9 0 0
Forlorn Hope	1	1½	3 5 0
Gong Gong	48	286¾	1,588 2 6
Good Hope	21	58¾	356 5 0
Groot Kop	2	41¼	236 0 0
Harrisdale	8	57	220 3 0
Hebron	105	538½	1,830 5 0
Holpan	21	217¾	1,449 7 6
Jonas Kopje	2	30	142 10 0
Keiskama	5	32	120 10 0
Klipdam	45	292	1,379 7 6
Klipdrift	69	309½	1,062 16 0
Longlands	29	175½	1,046 15 0
Loraville Estate	6	26	127 10 0
Niekerk's Rush	10	40¼	159 2 6
Ricketts Prospect	14	70¾	361 16 6
Schultz Prospect	25	225¾	1,541 10 0
Snyder's Rush	17	134¾	657 10 0
Union Kopje	1	38½	239 12 6
Van Zoelen's Laagte	16	137¼	1,041 7 6
Waldeks Plant	35	395½	3,169 5 0
Winters Rush	86	498½	2,641 15 0
Three Prospectors	3	4¾	26 10 0
	611	3,927¾	21,176 3 0

Note.—The number of claimholders in the mining district of Barkly West during the month of January, 1906, was 1,067.

HERBERT DISTRICT.

Brypaal	7	34	174 0 0
Davisdrift	2	12	100 0 0
Platdrift	9	39½	103 15 0
Schmidt's Drift	2	3½	9 4 0
Sevonelles	2	8½	18 15 0
Two Prolspectors	2	8½	48 15 0
	24	106	455 9 0

KIMBERLEY DISTRICT.

Robinson's Kopje	15	114	520 17 6
Wedberg	21	243½	1,407 0 0
	36	357½	1,927 17 6

TAUNGS DISTRICT.

Killarney	20	86¾	338 2 6

PERSONAL.

Sir Abe Bailey paid a brief visit to the Rand last week.

* * * *

Mr. H. Sharpley, general manager of the Pigg's Peak, has returned to the property from London.

* * * *

Sir Lionel Phillips, Bart., chairman of the Central Mining and Investment Corporation, has returned to the Rand after two years' absence in London.

MINING EXAMINATIONS.

Study for Certificates as Mine Captains, Mine Managers, Surveyors, Mechanical and Electrical Engineers, and Engine Drivers. Private Tuition and Correspondence Lessons, where personal tuition is impracticable. Practical Mathematics and Electrotechnics. E. J. MOYNIHAN, Consulting Engineer, Cuthbert's Buildings, Corner of Eloff and Pritchard Streets, Johannesburg. 'Phone 3664.

ECONOMIC GEOLOGY AND MINERAL INDUSTRY OF SOUTH-WEST AFRICA.

By Dr. P. A. Wagner.

The following treats in alphabetical order of the economically important minerals and mineral deposits of South-West Africa.

AQUAMARINE, BERYL, AND HELIODORE.

Pegmatite veins carrying beryl and aquamarine have been located at several localities in South-West Africa. The most important deposits occur in the vicinity of Rossing Station, on the Walvis Bay-Karibib railway, where are exposed a number of veins and lenticular bodies of coarse pegmatite containing prismatic crystals of common green beryl, aquamarine, and a very handsome new variety of beryl, to which the name heliodore has been given. The heliodore is yellowish, with a slight tinge of green and generally somewhat opalescent. A chemical analysis of the mineral by Hauser and Hersfeld gave the following result:—BeO 13.88 per cent., Al_2O_3 13.60 per cent., SiO_2 66.89 per cent., Fe_2O_3 .55 per cent., U_3O_4 .02 to .04 per cent.

During 1913 and 1914 fair quantities of heliodore and aquamarine, obtained from the exploitation of these deposits and of the "float" derived from their disintegration, were exported to Germany by the Kolonial Gesellschaft für Sudwestafrika. In regard to the prices realised no data are available. An unsuccessful attempt was made some years ago to work a similar occurrence of aquamarine at Donkerhoek, situated about thirty-three miles east-south-east of Jackalswater. At this locality the aquamarine, which occurs in drusy cavities in the pegmatite, is tabular parallel to (0001). It is accompanied by crystals of apatite.

ASBESTOS.

Asbestos is found to the east of Swakopmund, near the Gorap Mine, and also at Pforte on the old Swakopmund-Karibib railway. The writer has not visited any of the occurrences, but is informed on excellent authority that they are of no importance.

BUILDING STONE.

Apart from marble, which will be treated of separately, there appears to be an abundance of good building stone in South-West Africa. Owing to the limited local demand, no large quarries have, however, up to the present been opened up, and in such stone buildings as have been erected—farmhouses, police stations, etc.—any material that happened to be at hand was employed. In this way almost every description of rock, including gneiss, granite, quartzite, sandstone, limestone, indurated Dwyka shale, and surface limestone, has been used. The Schwarzrand and the Fish River beds of the Nama System furnish large, thin slabs of easily-quarried sandstone, which find extensive application in Great Namaqualand and also in the Grootfontein District for flooring purposes, doorsteps, and the construction of water-furrows.

COAL.

Nothwithstanding the fact that a considerable amount of prospecting and boring have been carried out within the area occupied by the rocks of the Karroo System, no workable seams of coal have as yet been discovered in South-West Africa. A few years back small lenticles of coal, up to 4 centimetres in thickness, were struck in dark Dwyka shale at Gariganis, situated about nine miles north-east of Keetmanshoop, in the course of sinking a well. Prospecting pits and boreholes were at once put down all over the surrounding country, but, despite the fact that one of the boreholes, sunk at Auros, attained a depth of almost 500 feet and appears to have penetrated the Dwyka Series down to the basal tillite, no further discoveries were made. A number of boreholes put down to the east and north of Gibeon, where thin films of coaly substance occur in the Karroo Sandstone, were no more successful; and the same applies to boreholes up to 330 feet in depth that were sunk in Auob Valley, near Stamprietfontein and Klein Nabas. That negative results were obtained in the neighbourhood at Keetmaushoop is hardly surprising, seeing that economically important seams of coal have not been found in the Dwyka Series anywhere in South Africa. The fact that nothing was struck in any of the boreholes put down in the Gibeon District indicates that there is likewise little probability of payable deposits being discovered in the Karroo Sandstone Beds. Altogether, the prospects of finding exploitable seams of coal in the southern part of the Protectorate do not appear to be very bright. The Karroo beds in the eastern and south-eastern portions respectively of the Gibeon and Gobabis Districts and in the Warmbad District, however, still remain to be examined. As regards the northern portion of South-West Africa, the sandstones and shales of the Kaoko Formation, which are believed to belong to the Karroo System and have been thoroughly prospected, have yielded no indications of coal. Several writers have suggested the likelihood of coal being discovered in the Caprivi Belt. As yet no evidence has been adduced for or against this view, but it appears to the author that, even if coal were discovered, it would be of very little value owing to the inaccessibility and unhealthy character of the area. A deposit of gilsonite (fissure-coal) is said to occur in the Karroo beds in the Gibeon District, but no information regarding it is available.

COPPER.

Copper mining provides, after diamond-mining, the most important industry of South-West Africa, and one which had been steadily expanding for some years prior to the outbreak of the war. Copper deposits occur, and have been opened up, at quite a number of widely separated localities in the areas occupied by the rocks of the Fundamental Complex and the lower division of the Nama System. Of these but few have proved worthy of exploitation, the only occurrences that have so far been worked at a profit being the Tsumeb, Gross Otavi, Asis, Asis East, Guchab, and Bobos Mines in the Grootfontein District, the Khan Mine situated to the south-south-east of Arandis, the Otjizongati Mine, which lies about thirty miles east south-east of Okahandja, and the Sincair Mine, situated in the north-eastern corner of the Luderitz Bay District. The various occurrences which have up to the present been examined and described may be classified as follows:—

1. Deposits in the Otavi dolomite, in which the copper is generally associated with lead.
2. Magmatic deposits, in which the copper minerals occur as segregations in pegmatite, aplite, and granite.
3. Pegmatic quartz veins, characterised by the presence of rutile or of rutile and ilmenite.
4. Quartz veins.
5. Impregnation deposits, in which the copper minerals as a rule form impregnations in mica-schist.

1.—Deposits in the Otavi Dolomite.

The Tsumeb Mine.—This is by far the most productive metalliferous mine in the country, and one of the most successful base metal ventures in South Africa. The earliest record of its existence is contained in the journal of Sir Francis Galton (2), who on his way to Ovamboland, in 1851, met several caravans of Bushmen conveying copper ore from Tsumeb to Ondonga, where it was smelted by the Aandonga, an Ovambo tribe, especially skilled in metal work. The true importance and possibilities of the occurrence were first realized in 1901, when an expedition, sent out by the South-West Africa Company of London, was able, by a comparatively insignificant amount of development work, to block out copper and lead ore to the value of one million pounds. This brought matters to a head, and the Otavi Mines and Railway Company, which had acquired from the South-West Africa Company the mineral rights over an area of about 5,000 square miles in the central portion of the Grootfontein District, at once set about linking up Tsumeb with Swakopmund by means of a narrow-gauge railway. From the time of the completion of this railway, in 1907, to the outbreak of the war the Tsumeb mine had a most profitable career.

The Deposit.—The Tsumeb deposit consists of two large, steeply dipping ore-lenses, in grey Otavi dolomite, separated by a constriction which is occupied on the foot-wall of the ore-bodies by an intrusion of aplite. The ore-bodies, as well as the aplite, are intersected by narrow dykes of highly altered olivine-kersantite. The ore is generally separated from the dolomite by a clayey selvage, and in the hanging wall of the deposit several fair-sized cavities were met with. The strike is from east to west. The western ore-body, to the greatest depth hitherto attained (525 feet), dips at an angle of about 70 degrees to the south. The eastern ore-body also dips to the south at an angle of about 55 degrees as far as the second level (154 feet), but below that the dip is at about the same angle to the north. At the surface the combined length of the two ore-bodies was about 550 feet and their maximum width 46 feet. At depth the length of the deposit was found to decrease, but the width increased as far as the second level (154 feet), where it was as much as 80 feet. Below the second level there was again a falling off in width. The shape of the ore-bodies varies considerably from level to level, as is clearly shown on the accompanying sections. The mine, as previously indicated, has been opened up to a depth of 525 feet. At this depth the western ore-body, though somewhat reduced in size, is as rich as ever, but the eastern ore-body exhibits a very marked impoverishment. The dolomite forming the country rock is much folded and disturbed. It has undergone secondary silicification, but it appears very doubtful whether this silicification has anything to do with the genesis of the ore-deposit. In the vicinity of the ore-deposit the dolomite is traversed by narrow veins and stringers of chalcocite. The aplite is a fine-grained rock composed of quartz, felspar, and small quantities of mica. In the lower levels of the mine the rock is strongly impregnated with ore, and much of it will repay repay exploitation.

(To be continued.)

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RAND METALLURGICAL PRACTICE.—VII.

Discussion of Mr. F. L. Bosqui's Paper—Views of Rand Metallurgists.

THE following is the continuation of Mr. H. A. White's contribution on Mr. Bosqui's paper, wrongly attributed to Dr. Caldecott in our last issue:—

Mr. Bosqui's idea of treating a charge with cyanide solution in the same vat in which it is collected by water, re-introduces the identical defect which finally caused the abandonment of double treatment on the Rand, referred to by Mr. Bosqui. In that case also, the consequent contamination of the mill water by cyanide, and the inevitable, continuous loss of gold was aggravated by the occasional accidental heavy losses caused by allowing the cyanide solution to run into a vat still being filled by water-borne sand. These losses were doubtless better known than advertised; nevertheless, the re-introduction of such possibilities is a retrograde step in defiance of the more modern practice which encourages only one method of getting cyanide solution into the mill water-stream, *i.e.*, with a bucket. The new plants of the Barnato group now working, such as the Van Ryn Deep, Ltd., keep the collecting and treatment vats separate and double wash the sand to free it from colloidal slime, getting a better effect from the added water than can be possible in the single-stage hydraulic separation advocated in this paper. Why this conservatism with regard to the sand filter table? True, it is a local invention, yet this method is coming into extended use, and experience on mines such as the East Rand, the Princess Estate, the Geduld Proprietary, the Modder Deep, and the City and Suburban Mining and Estate Co., Ltd., warrants a belief in its future. At the Geduld and Princess the conversion of old plants enabled a true comparison to be made and the improvement in sand residues in strictly comparative experiments on a working scale of 0·05 dwt. at the Princess was much more than confirmed at the Geduld, where there was a greater margin to work on. With the sand filter table system the dewatered sand is pumped in a stream of weak cyanide solution to the collecting vat where the treatment is also finished and every particle of sand must come into contact with cyanide solution, which is not inevitably the case with any other method. Thus we get the advantages of a preliminary "weak wash" which formerly had to be discontinued because of the time lost, while now the sand is under treatment half an hour after it has left the tube-mill plates. As far as capital cost is concerned, even with treatment in collecting vats, no great saving can possibly be shown if it be recollected that a longer time of treatment will of necessity be required with a water-collected charge, so that more vats must be installed than are required in the safer filter table method. As regards cost of maintenance and operation, a reference may be made to an extract from the official report on the filter table at the City Suburban. The excellent results there shown with regard to light cost and increased extraction serve to confirm the general experience and justify the adoption of the sand filter table system on the fine new plant at the Modderfontein Deep, the most recent on these fields. In this last instance, of course, no comparison with older systems is possible, but the results obtained were better than anticipated from the preliminary small-scale tests made. The Dorr collecting vat for slime may have the attributed disadvantage of not being a local engineering product, but so far the real reasons for its absence on modern Rand plants are as follows: (1) The increased capacity for a given area is small, as pointed out by Mr. Bosqui. (2) The extra moisture contained in the underflow involves a loss of about 2 cents. per ton for cyanide alone (required to bring this extra water up to treatment strength.) The figure given by the author for moisture in settled slime in the ordinary collector (50 per cent.) is much too high, and modern plants easily secure a reduction to 40 per cent., and still lower figures are obtained when much fine sand is present. The use of 70 ft. vats in place of the 56 ft. mentioned is also becoming general in pursuit of the successful "large-unit" policy. (3) The increased capital and running costs of the Dorr vat have insufficient advantages over the simple method now in use. The Butters filter system, for the introduction of which our thanks are largely due to Mr. Bosqui, is highly appreciated and would have much more extended use it the slime here were generally of higher value than it is. The extra cost is balanced only by the higher extraction when the original slime value is in the neighbourhood of 2 dwt. Take for example the Princess Estate where the average value of the residue is under 10 cents., and many other mines where it is under 20 cents., the undissolved gold accounting for more than half of this. In such cases it is clear that the quoted running cost of 6 cents. to 8 cents. will leave little margin to pay for the extra capital cost involved. This process is very successful at the Geduld with slime of initial value of 3.5 dwt., and where, by the way, the only continuous use of air-lift vats on *current* slime is at yet practiced, beside the new plant at the Modder Deep. The East Rand Proprietary Mine vats are used for accumulated slime at present. The economy in zinc consumption claimed for the Merrill press is not warranted by the figures quoted (0·152 and 0·154lb. per ton of solution. The average figure for the Rand is about 0·35lb. per ton of pulp and on some plants 0·25lb. is maintained. This worked out on a 2½ to 1 pulp, the usual ratio, would be 0·14lb. and 0·10lb., respectively, per ton of solution. Any economy per ton of pulp shown by the Merrill system must, therefore, be offset by reduced treatment, and the figures given for gold value of the residual solutions, being distinctly poorer than those obtained with zinc shaving, contribute to the impression that this process, though not without valuable features, will have to seek a welcome elsewhere. While it must not be overlooked that the presence of zinc increases the stability of cyanide solutions to an extraordinary degree, there is the possibility of adopting some new method if it can show greater security of gold, ease of clean up, and reduction of space, combined with practically complete extraction of the gold value from very dilute solutions. It has frequently been a matter of regret to the Rand metallurgists that processes and devices apparently successful elsewhere, have proved unsuited to local conditions. Although fresh information of local or oversea origin and development will always be welcome, the present, "conservative" attitude of preferring actual trial to glowing verbal accounts will continue manifest in Rand metallurgical practice.

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ELECTRO-CHEMICAL INDUSTRIES FOR SOUTH AFRICA.—III.

Important Report by Development of Resources Committee of the S.A.I.E.E.

Appendix No. 2.

COST OF ELECTRICITY.

Steam Power Station.—With a modern steam generating station, assuming a capacity of about 5,000 k.w., and a suitable site with a plentiful supply of cooling water, the total capital cost should not exceed £15 per k.w. for plant, with a further £5 per k.w. for buildings and land. With a load factor of 0·83 per cent. the capital charges at 10 per cent. amount to 0·067d. per unit. Fuel, with coal of 11,000 b.t.u., costing 7s. 6d. per ton would amount to nearly 0·15d. per unit. Repairs, maintenance and stores about 0·06d.; labour and management, say, 0·07d., so that the total cost—with the good load factor of 83 per cent.—should not exceed 0·35d. per unit.

Water-Power Station.—Where suitable water power is available, so that the capital cost is, say, £30 per k.w. of plant, the capital charge is (on the same basis as above) 0·1d. per unit generated. For repairs, maintenance and stores allow 0·04d., and for labour and management 0·06d., so that in this case the total cost should be under 0·2d. per unit.

COSTS OF A FEW ENGLISH STATIONS.

	Units in Millions.	Plant Cost per k.w.	Land Factor.	Working Costs, pence per unit. Fuel.	Repairs and Stores.	Labour and Management.	Total Working Costs.
Central London ...	29.0	£40	0.34	0.24	0.06	0.10	0.45
Midland, E.C.. ...	18.0	43	0.18	0.21	0.12	0.11	0.48
Prescot	6.5	24	0.27	0.29	0.07	0.09	0.44
Bury	10.7	27	0.32	0.18	0.07	0.10	0.38
Coventry	20.0	30	0.22	0.18	0.07	0.07	0.33
Leeds	43.0	50	0.30	0.18	0.08	0.08	0.36
Stalybridge	18.6	17	0.21	0.14	0.04	0.08	0.29
Newcastle Dist. ...	18.7	59	0.31	0.24	0.09	0.10	0.48
L.C.C. Tram	154.0	—	—	0.23	0.03	0.06	0.32

Note.—All these costs include distribution.

Appendix No. 3.

CYANAMIDE.

The theoretical equation for the conversion of carbide in cyanamide shows that 2,000 tons of pure carbide and 875 tons of nitrogen gives 2,500 tons cyanamide and 375 tons carbon. It is not, however, commercially practicable to use pure carbide, nor is more than about 90 per cent. of it converted into cyanamide. The costs given in Appendix 1 are for commercial carbide of about 85 per cent. purity, and furthermore in manufacturing cyanamide the carbide is not separated from the impure surrounding crust (which is also ground with the purer core). In practice, therefore, there will be required 2,350 tons of commercial carbide, 875 tons of nitrogen of which only 90 per cent. is utilised and 860 tons of inert matter such as lime, uncombined carbon, ash, etc., to produce 4,000 tons of commercial cyanamide containing 20 per cent. of nitrogen.

From particulars obtained from the British Oxygen Company, it appears that a plant to produce 875 tons nitrogen per year, with a margin of 20 per cent., would cost in this country about £3,000, while the furnaces, pipes, crusher plant, bunkers, buildings, etc., would cost a further £8,000 and allowing, say, £2,000 for working capital (being cost of labour and material for three months) the total capital cost of the Cyanamide Plant will amount to £13,000.

ESTIMATED MANUFACTURING COSTS FOR 4,000 TONS OF CYANAMIDE.

Electrical energy at 0.35d.—	
To produce 4,000 tons Cyanamide	£1,500
To produce the requisite Nitrogen	675
Labour and material for operating and repairing	3,325
Office Expenses	1,000
Depreciation of 10 per cent.	1,000
	£7,600
Contingencies, 20 per cent.	1,520
	£9,120
2,350 tons of Carbide at £11 10s. 0d.	£26,925
Total Factory Cost	£36,045
Total Factory Cost per ton	£9 0 0

The cyanamide furnaces require about 100 k.w. for heating, and 20 k.w. is ample for driving the grinding machines. The cost of this electric energy at 0·35d. per unit with an average load factor of 92 per cent. is £1,500 per annum. The cost of electric energy for nitrogen has been based on the production of 875 tons plus 20 per cent., together with a further allowance of 25 per cent. for gas wasted. The cost of carbide is taken at £11 10s. per ton, which is the cost for an output of 5,000 tons per annum (see Appendix No. 1.) Although only 2,350 tons are required for producing the 4,000 tons of cyanamide, it is assumed that the remaining 2,650 tons would be required for sale as carbide, this being approximately the amount at present imported. It should be noted that in the production of 875 tons of nitrogen, about 200 tons of oxygen would be generated, and this would produce a revenue depending on the demand for oxy-acetylene welding, etc.

Appendix No. 4.

CYANIDE.

By fusing cyanamide with carbon and salt, calcium cyanide is produced, and if this is acted upon by sulphuric acid, hydro-cyanic acid gas is set free. By passing this gas into a solution of caustic soda, pure sodium cyanide is obtained. An approximate idea of the cost of manufacturing sodium cyanide from cyanamide is obtained by noting that 2,000lb. of 20 per cent. cyanamide costs about £9 and contains 400lb. of nitrogen. Assuming 90 per cent. conversion, this gives 1,260lb. of sodium cyanide in the impure mixture which results, and requires 1,700lb. of common salt (costing £2) and 1,500lb. of fuel (costing 12s.). The cost of 1,260lb. of crude cyanide is, therefore, about £11 12s. An amount of sulphuric acid equal in weight to the cyanide is required to liberate the hydro-cyanic acid gas and 1,030lb. of caustic soda is necessary to absorb this gas. Allowing a further loss of 5 per cent. in these re-actions, the total cost of 1,200lb. of pure sodium cyanide is: firstly, the cost of 1,030lb. of caustic soda at £15 per ton, viz., £7 15s.; secondly, the cost of 1,260lb. of sulphuric acid at £14 per ton, viz., £8 16s.; and, thirdly, the cost of 1,260lb. of crude cyanide, viz., £11 12s. The total cost of the raw materials is, therefore, £47 4s. per ton.

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It has not been possible to obtain particulars as to the cost of the requisite plant or the operating and maintenance costs therefor, but the lowest pre-war cost of sodium cyanide was 8½d. per lb., or about £71 per short ton, and the difference between this figure and the above-mentioned cost of raw materials, viz., £23 16s. per ton, would appear to be much more than sufficient to cover these remaining costs, including all capital charges. There are numerous other methods that are or have been used for the manufacture of cyanide, but the above offers the most promising results for this country and, when locally made sulphuric acid and caustic soda are available, the above cost of raw materials would be materially reduced.

APPENDIX No. 5.

OTHER PRODUCTS.

Where electric energy is available from water power at a very low price, say, 0·1d. per unit, as might be obtained during the rainfall season by the more complete utilisation of existing plant, some of the electric methods of fixing atmospheric nitrogen in the form of nitric acid become commercially practicable. A description of the systems in use appears in the Journal of the S.A. Institute of Electrical Engineers for October, 1911. Nitric acid is valuable as a base for many modern explosives and as a re-agent in the dye industry. Iron and steel manufacture by means of the electric furnace offers a wide field for the economical working-up of the large amount of scrap in the country, and the production of pig iron from the extensive ore deposits of the Murchison range would become practicable in the event of cheap electricity becoming available. The cost of power in the best types of electric furnace, assuming 0·35d. per unit, is:—

	Per ton.
To produce Steel from cold scrap	33/6
To produce Steel from pig iron	26/6
To produce Steel from ore	81/-
To produce Pig Iron from ore	70/-

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Brakpan Mines.

The following information is officially supplied in regard to the February, 1916, output:—Stamps working, 140; running time, 28 days; ore crushed, 61,800 tons; tube mills working, 10; ore hoisted, 70,482 tons; ore from dump, nil; waste sorted, 11·75 per cent.; fine gold declared, 21,318·57 ozs.; value declared, £89,654; equal to 29s. 0·17d. per ton milled; working costs, £56,716; equal to 18s. 4·26d. per ton milled; working profit, £32,938; equal to 10s. 7·91d. per ton milled.

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FEBRUARY OUTPUT: GROUP RETURNS.

Rand Mines Group.

The following are the results of crushing operations of subsidiary companies for the month of February:—

Company	No. of Stamps Running.	Tube Mills.	Tons crushed.	Estimated Working Costs per Ton.	Total Fine Ozs.	Total Estimated Profit.
Rose Deep ...	300	7	65,400	18/ 0·9	19,120	£20,203
Geldenhuis Dp.	300	7	56,100	20/10·7	17,358	13,603
Nourse Mines .	260	7	52,000	20/ 0·5	15,051	10,458
Ferreira Deep .	280	7	51,410	21/ 9·1	22,685	38,156
Crown Mines ..	660	26	188,000	19/ 2·4	60,690	71,559
Durban Rd. D.	100	3	26,990	22/ 7·9	8,565	5,050
Tls. & averages	1900	57	139,810	19/10·3	143,379	£159,029

The following are the results of crushing operations of Central Mining Companies for the month of February:—

Company.	No. of Stamps Running.	Tube Mills.	Tons crushed.	Estimated Working Costs per Ton.	Total Fine Ozs.	Total Estimated Profit.
Modder B. ...	*96	6	45,000	17/ 3·6	22,799	£55,895
New Modder ..	180	7	51,000	17/ 5·1	25,508	61,656
City Deep	†154	9	60,000	19/11·5	28,695	59,460
Village Deep ..	180	7	49,900	21/ 5·1	17,662	19,993
Village Main R.	160	4	23,680	21/10·4	8,390	9,604
Robinson	250	6	55,900	14/ 3·9	16,490	28,521
Bantjes Cons...	90	3	24,180	19/ 3·6	5,611	10
Tls. & averages	1110	42	309,660	18/ 5·6	125,155	£234,539

* Includes 16 Nissen stamps.

† Includes 4 Nissen stamps.

Barnato Group.

The results of operations of the Barnato group for February are as follows:—

Mine.	Stamps.	Tons Crushed.	Revenue from Gold
Consolidated Langlaagte ...	100	51,000	£66,242
Ginsberg	80	14,875	17,006
Glencairn Main Reef	160	20,000	13,029
Government G.M. Areas ...	100	51,000	66,452
New Primrose	140	20,000	16,018
New Unified	60	12,750	13,481
Quest	35	3,964	2,783
Van Ryn Deep	80	43,000	82,829
Witwatersrand	215	40,850	54,075
February totals ...	970	257,139	331,918
January totals	965	267,741	334,230

Mine.	Total Working Costs.	Working Costs per Ton Milled.	Gross Profit including Sundry Revenue.
Consolidated Langlaagte ...	£11,133	16·131	£25,595
Ginsberg	13,187	18·133	3 641
Glencairn Main Reef	12,248	12·248	2943
Government G.M. Areas ..	50,145	19·782	16,414
New Primrose	13,291	13·291	2,859
New Unified	9,230	14·478	4,342
Quest	2,668	13·461	183
Van Ryn Deep	38,545	17·928	45,043
Witwatersrand	32,244	15·786	23,693
February totals ...	£213,291	16·570	122,713
January totals ...	£214,613	16·031	£123,882

Monthly Gross Profits.—January, £123,882; February, £122,713.

Neumann Group.

The following are particulars of the results achieved by the crushing companies of this group during last month, and officially supplied, viz.:—

	TONS.	YIELD.	PROFIT
Witwatersrand Deep ...	39,620	£49,374	£14,034
Wolhuter	33,909	42,770	12,182
Consolidated Main Reef ..	28,100	40,636	12,587
Main Reef West	25,740	28,277	3,046
Knight Central	26,750	28,164	3,019
Total for group ..		£189,221	£14,868

Albu Group.

The following information is officially supplied regarding the February operations of the producing companies of this group:—

Company.	Stamps.	Tons Crushed.	Total Cost.
Aurora West	80	14,400	£13,534
Meyer and Charlton	75	14,400	14,240
New Goch	120	28,750	20,552
Roodepoort United	80	34,729	30,853
Van Ryn Estate	140	37,000	28,168
West Rand Consolidated ...	100	31,200	30,104
February totals	595	160,135	£137,451

Company.	Cost per Ton.	Total Revenue.	Profit.
Aurora West	18 9·5	£17,536	£4,002
Meyer and Charlton	20 3·1	33,564	19,324
New Goch	14 3·6	29,261	8,709
Roodepoort United	17 9·2	36,130	5,277
Van Ryn Estate	15 2·7	45,357	17,189
West Rand Consolidated ..	19 3·6	37,587	7,483
		£199,435	£61,984

Aurora West.—Experience over an extended period having demonstrated that the charge to working costs in respect of development redemption has been in excess of the actual cost of the development work required to fully maintain the ore reserves, it was decided to reduce the charge by 1s. per ton as from the 1st February. If the present percentage of payability of the ore developed continues, a further reduction in the redemption charge may be justified as from the beginning of next year.

Goerz Group.

Results of operations of the producing mines of this group for the month of February:—

Company	Stamps.	Tons Crushed.	Total Revenue.	Revenue per ton
Geduld Proprietary	60	25,200	£42,299	33 7
May Consolidated	100	12,820	10,551	16 5
Modder Deep Levels ...	60	31,000	63,068	37 1
Princess Estate	60	22,300	28,631	25 8
Totals	280	94,320	£144,549	—

Company.	Costs. Total.	Costs. Per Ton.	Profit. Total.	Profit. Per Ton
Geduld Proprietary ...	£28,295	22/ 5	£14,093	11/2
May Consolidated	9,951	15/ 6	600	0/11
Modder Deep Levels ...	28,711	16/11	34,354	20/2
Princess Estate	28,307	25/ 5	324	0 3
Totals	£95,178	—	£49,371	—

Consolidated Gold Fields Group.

The following are the particulars in regard to the outputs and profits for the month of February, 1916, of the undermentioned companies of the Consolidated Gold Fields group:—

Company.	No. of Stamps.	Tube Mills.	Tons Crushed.	Gold declared. Fine Ozs.	Total Profit.
Simmer and Jack ...	320	7	64,000	17,331	£26,640
Robinson Deep	130	10	45,100	17,657	23,151
Knights Deep	400	11	109,000	19,759	16,450
Simmer Deep	220	10	61,100	13,187	5,148
Jupiter	80	5	21,200	5,664	4,533
Sub Nigel	30	2	7,490	3,633	3,715
Totals	1,180	45	307,890	77,231	£79,637

Reserve Gold:—Simmer and Jack, 4,680 ozs.; Robinson Deep, 1,907 ozs.; Knights Deep, 3,256 ozs.; Simmer Deep, 715 ozs.; Jupiter, 1,250 ozs.; Sub Nigel, 1,720 ozs.; total, 13,528 ozs.

The sundry revenue included in the above total declared profit is as under:—Simmer and Jack, £1,500; Robinson Deep, £1,054; Knights Deep, £240; Simmer Deep, £623; Jupiter, £742; Sub Nigel, £206; total, £4,365.

Glynn's Lydenburg.

The following are the particulars of this company's output for the month of February, 1916:—Tons crushed, 3,360; yielding 1,426 fine ozs.; estimated value of month's output, £5,953; estimated profit for the month, £1,971. The mine was hung up for four days owing to alterations to the power station pipe line.

Transvaal Estates.

The following are the particulars of the Transvaal Gold Mining Estates, Ltd., output for the month of February: Central Mines.—Tons crushed, 11,850; yielding, 5,439·621 fine ozs. Elandsdrift Mine.—Tons crushed, 1,370; yielding 1,206·933 fine ozs. Vaalhoek Mine.—Tons crushed, 1,400; yielding, 586·471 fine ozs. Estimated value of month's output, £30,027; estimated profit for the month, £10,246.

Nigel G.M. Co., Ltd'

The returns from this company's mine for the month of February are as follows:—Tons milled, 11,000; gold, 3,092 fine ozs.; loss, £1,461.

New Kleinfontein.

Appended are particulars regarding the operations on this company's property for February:—Stamps, 200; days, 27·02; tube mills, 4; tons milled, 49,000; gold recovered (fine ozs.), 15,114·233; net value, £62,724 1s. 4d.; profit, £17,000 5s. 1d.; working costs (excluding development), 16s. 10·953d.; development to working costs, 1s. 9d.; total working costs, 18s. 7·953d.; capital expenditure, £165 0s. 4d.; capital expenditure upon Apex and Benoni sections, £10,766 7s.; maintenance upon Apex and Benoni sections, £1,065 19s. 10d. Note.—Owing to the breaking of a coupling of the line shaft, thirty stamps were hung up for six days, which resulted in a considerable loss of tonnage.

Zaaiplaats Tin.

The Zaaiplaats results for the month of February, 1916, were as follows:—Days run, 21; ore milled, 1,937 short ton; residues re-treated, 1,807 short tons; concentrates won, 25 long tons; average value of concentrates, 71 per cent. metallic tin; estimated loss for the month, excluding Government taxes on profits, £1,139 0s. 7d.; deduct adjustments in respect of estimated values of previous shipments, £777 0s. 6d.; loss declared for the month, £362 0s. 1d.; capital expenditure, nil. Note.—Revenue for the month has been calculated on the basis of tin at £180 per ton.

Luipaardsvlei Estate.

During the month of February this company crushed 20,235 tons, the total profit won being £3,419.

The directors' report of the Luipaardsvlei Estate for the quarter ended 31st December, 1915, shows that the number of feet driven, sunk, risen, etc., was 3,794 feet; ore developed, 83,023 tons; ore mined, 77,558 tons; waste rock sorted out (not included in ore reserves), 14,303 tons; ore in mill bins decreased by 705 tons; ore developed in excess of ore crushed during period, 19,063 tons; ore crushed, 63,960 tons; total yield in fine gold from all sources, 17,031·877 ozs.; total yield in fine gold per ton crushed, 5·326 dwts. The ore reserves at 31st December, 1915, totalled 678,797 tons. The profit for the quarter was £14,029, including sundry revenue.

The Lonely January Output.

The following are the particulars of the output of gold from the Lonely mine for the month of January:—Mill ran 619 hours; crushed 4,020 tons; yield of fine gold, 574·622 ozs., value £2,415 13s. 3d.; slimes treated, 4,020 tons; yield of fine gold, 2,150·011 ozs., value £9,042 0s. 4d.; total recovery of fine gold, 2,724·633 ozs.; total value, £11,457 13s. 7d.; estimated profit, £3,173.

Rhodesia Limited.

The secretary issues the following circular, dated 2nd ult.:—"The directors are pleased to be able to report that development work on a block of claims in the Bulawayo district known as 'The Annasona,' on which the company last year acquired an option to purchase, has yielded satisfactory results, and the option has been exercised. Crushing operations will be started as soon as possible, and it should not be long before regular returns are received from the mine. The proposition, although as far as at present developed not a large one, shows very high assay values. The directors have also to report that arrangements have been made for the finances necessary to equip and work the Sabiwa mine. A new company with a share capital of £125,000 (in 500,000 shares of 5s. each) will be registered in Rhodesia forthwith to acquire the Sabiwa mine from Rhodesia Limited. Arrangements have been made in a responsible quarter to provide the new company with £75,000 on loan or debentures repayable in fifteen years or earlier as profits permit. The result of the arrangements will be that Rhodesia Limited will receive for the Sabiwa mine £25,000 in cash and 250,000 shares of 5s. each, while the new company will have £50,000 wherewith to equip and bring the mine to a producing stage."

Manicaland Output.

The mineral output of the territory of the Companhia de Mozambique (Manicaland) for the month of January, 1916, was as follows:—Reef: Mill: Gold won (fine), 49 ozs. 13 dwts. 19 grs.; tons crushed, 237; value, £205 18s. 3d. Alluvial: Gold won (fine), 1,069 ozs. 16 dwts. 14 grs.; cubic metres dredged, 81,680; value, £4,434 17s. 3d.

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THE WEEK IN THE MINING MATERIAL AND ENGINEERING TRADES.

Business Dull, Awaiting Signs for the Future—Fencing Manufacturers Turning Attention to Mine Work—Local Iron Works Refusing Orders—Second-hand Goods in Demand.

THERE is very little new development to report in the mining material trade this week, as the slackness reported last week still continues. This is accounted for in consequence of the extra buying last month, owing to the dismay created by the disturbance of the shipping on the West African coast. The war news has also been anxiously examined this week, as it is an acknowledged fact that the mines are very well supplied with stores, chemicals, and everything pertaining to the running of the producing mines, and signs are eagerly looked for to obtain an inkling of the future trade requirements. It may be a little premature, but ideas are prevailing amongst importers that they must not be caught with heavy stocks, for, although stores and machinery may not be cheaper after the war, yet freight will, when the shipping resumes normal conditions, and such anticipations are always well discounted in advance. So far there has been little or no talk on the Commercial Exchange about restricted markets after the war, which may be accounted for by this being such a cosmopolitan city of commercial men. Naturally, the question of preferential tariffs will be considered in the sweet by and by. In the meantime, local makers are busy with many things required by the mines, that no one would have thought of touching under normal conditions. For example, the trade of the wire fencing makers is something like 50 per cent. under normal in the demand for wire fencing, owing to the drought interfering, in parts, with the farmers and new buildings requiring fencing for the gardens are a dwindling quantity. Well, what has been done? Why, the fencing makers have switched their works on to making screenings for the mines, all of which were imported in the pre-war days. Yet another instance of local activity, a fairly extensive order was received from Rhodesia for tube mill steel linings, as it was thought they could have been secured out of stock in Johannesburg; but this was impossible; therefore, the Vereeniging Works were asked if they could quote, and the reply came that no more orders could be accepted for the next few months as they were bound in all fairness to complete the present orders on hand. It appears that under ordinary conditions the steel linings referred to were always secured from the best steel works in Sheffield, but now that cannot be done our local people have essayed the task, with considerable success. Obviously, our South African iron works never anticipated such a rush of orders for their limited plants, and now, perforce, the plants in question have to do the best they can, as it is out of the question to get any new machinery of a large comprehensive nature until the war is over. In reply to cable enquiries on this subject, the recognised works in Britain will take machinery orders, but a delivery guarantee will not be touched upon. Naturally, much comment has been passing in reference to the Portuguese people taking the interned ships. As regards the political aspect, the less said the better in trade notes; but from a business point of view, the question has been much ventilated as to whether it will assist the shortage in the commercial shipping world.

SECOND-HAND MATERIAL.

According to the information gleaned from a representative second-hand material yard, business has revived, chiefly, so it is supposed, from the dearness of new material. Quite a fair number of enquiries have been received so far away as the Orange Free State, and not a few orders have resulted. It must be remembered that although in some parts the drought has played havoc with the agricultural community; yet in other parts, conditions are not at all bad. Therefore, the farmers who are wanting to repair cattle sheds and outhouses, have sent orders to Johannesburg, where it is recognised that usually any reasonable requirements can be arranged for, obviously at a price in accordance with the times. The following are current rates: Galvanised iron, 7d. per foot run; standard deals, 7d.; flooring, 4d.; ceiling, 2¾d.; large windows, £1 each, according to condition. Barbed wire, 19s. to 22s. 6d. per coil of 500 yards; plain wire, No. 8, 14s. 6d. per roll of about 500 yards; wire netting, 2in. mesh, 36s. for 50 yards. A second-hand yard seems essentially a place for a personal visit, which question was touched upon, when the answer emphatically came that country customers must be well treated, otherwise disputes might arise and so destroy good relationship—which was always bad for business, and competition was great in this line in Johannesburg.

SECOND-HAND MACHINERY AND MATERIALS.

In the early days second-hand places were all of a jumble; but now they have developed into separate sections, one for machinery and mining material and the other for farm and building materials. The machinery section is now the busier of the two, as there is a brisk demand for small batteries, for Rhodesia, the Northern Transvaal, and, in a lesser degree on the West Rand. A difficulty is experienced in obtaining spares for these small batteries; but with the assistance of the blacksmith, and the cleverness of adaptation by the men who are in charge, it is a very poor battery indeed which cannot be utilised. The last order for a small battery has been received from the Klein Letaba district. Evidently there is a lot of quiet work being done, in readiness for the future, when high hopes are entertained for a big move for claims containing gold, diamonds, and the baser metals.

WHITE LEAD, OILS, COLOURS, AND PAINTS.

Although cables were received this week saying that white lead had another advance in Britain, our local price has not farther risen. There has been a lot of controversy during the week as to the various quoted prices at different centres throughout South Africa. The explanation is simple, because when a job is waiting, say, in Capetown, where it is understood the highest price has so far been paid, for about a ton, to complete a job, or rather to prevent workmen standing still until a consignment was received from Johannesburg, it is not surprising that price will not stop a contractor who has important works to complete at a given time. However, now there seems to be a slight lull in the demand for white lead and, perhaps, if anything, values are not quite so solid as last week. It must be borne in mind also that our standard list applies to the best brands of genuine white lead; but like most things there are various lower class brands which can be obtained cheaper, but all kinds and descriptions have advanced, more particularly during the past six months. Linseed and turps. are up about half-a-crown per case this week. Although business is not good amongst contractors, yet there is always something going (as Johannesburg is a big place) on jobs which, usually, cannot be hung up any longer. The best British plate-glass ¼in. is 3s. 6d. per square foot. Fair stocks are on hand and regular shipments are expected to come forward. Business is not brisk, but a fair amount is doing.

TIMBER AND BUILDING MATERIALS.

Business is dull, but what little is going is just opposite to last week's trade, when the mines took the first place, but now the general building and jobbing contractors have the first place and the mines the second, as regards the demand. It is pleasing to record that the firm from whom this information was obtained, volunteered the news that they had secured contracts for supplying timber and hardware for four separate private houses to be erected at once in the Johannesburg suburbs. The brick trade shows signs of a little improvement, without any alteration in prices. The hardware firms catering for grates, stoves, baths and sanitary ware are doing a fairly steady business—as good as can be expected. An architect says it is not a too correct presumption that building is active

because a number of plans are passed by the Municipality, as many owners are getting ready, but are not always in a hurry to ask for tenders for the actual building.

Electrical Goods.

Business is bad in the contracting line because of the shortage of electrical goods, as it is so difficult (and in some lines impossible) to obtain a complete lot of material to start and finish off a good sized job. Almost the only thing in plenty is lamps. The morning when the enquiry was made, the manager had enquiries over the telephone for no less than fifteen lines, and could only supply one. There is no pure rubber flex in town in wholesale quantities, and coils of wire of 3/20 and 3/12 gauge cannot easily be obtained. Our list of prices has been carefully overhauled, but owing to these abnormal conditions too much reliance cannot be placed upon them, although they are quite near enough to give an intelligent guide.

Revised Price List.

Approximate war prices, subject to quick change.—Mining and building hardware: Iron, imported, bar 20s. 22s. 6d., 25s. and 27s. 6d. (local do., 15s. up), angle, 21s. to 21s. 6d. per 100 lbs.; mild steel bar, 3d. lb.; drill, 5½d. lb.; tool, 7½d. to 9d. lb.; steel plates, 10ft. x 4ft. x 1-16in., 24s. 6d.; do., ⅛ in. and 3-16 in., 23s. 6d.; ¼ in. and upwards, 27s.; 10 ft. x 5 ft. x 1-16 in., 28s. 6d.; ⅛ in. and 3-16 in., 25s.; 10 ft. x 6 ft. x 1-16 in., 27s. 6d.; 3-16 in. x 10 ft. x 4 ft., 26s.; ¼ in. up, 10 ft. x 4 ft., 25s. to 27s.; hexagon bolts, ⅜ in. to 3 in., 8d. per lb.; over 3 in., 7d. lb.; ½ in. up to 2½ in., 45s.; 2¼ in. to 6 in., 42s. 6d.; 6½ in. and over, 40s.; ⅝ in. up to 2½ in., 37s. 6d.; 2¾ in. to 6 in., 35s.; 6½ in. and up, 32s. 6d.; ¾ in., ⅞ in., and 1 in. up to 2½ in., 32s. 6d.; 2¾ in. to 6 in., 30s.; 6½ in. and up, 29s. per 100 lbs. Nuts, ⅜ in., 9d. lb.; ½ in., 50s.; ⅝ in. to 1½ in., 47s. 6d.; 1⅝ in. to 1¾ in., 52s. 6d. per 100 lbs.; 2 in., 7½d. per lb.; washers, ¾ in. and under, 30s., and above that size, 30s. per 100 lbs.; shoes and dies, 30s. to 32s. 6d. per 100 lbs.; rails, £15½ per ton; picks, 4 lbs., 22s. 6d. per doz.; shovels, 32s. 6d. to 42s. 6d. per doz.; hammers, drill, 6d. to 9d. lb.; hammer handles (best American), 14 in., 3s. 6d., 24 in., 5s. 6d., 30 in., 7s. 6d., 36 in., 10s. 6d. per doz.; metal, anti-friction, 1s. per lb.; galvanised iron, 24 gauge, 6 ft. to 10 ft., 9¼d., 11ft., 9⅝d., 12ft., 9¾d.; 26 gauge, 6ft. to 10 ft., all lengths about 7d. to 7½d.; flat galvanised, 18 to 24 gauge, 31s.; 26 gauge, 32s. 6d. 100 lbs.; floor bolts, 27s. 6d.; ceiling, 27s. 6d.; wire nails, 25s. 6d. to 30s. per 100 lbs.; solder, 50 per cent., 1s. 2d. per lb.; locks, rim, 45s.; mortice, 60s. doz ; barbed wire, 20s. to 22s. 6d. 100 lbs. coil.

Timber: Deals, Baltic, 9x3, up to 16ft. 10½d.; over, 10¾d. to 11½d. (Oregon, 10¾d.); flooring, 4½x⅝ & 6x⅝, 5½d. to 5½d. per sq. ft.; do., 4 x 1⅛, 6¾d., and 6 x 1⅛, 6½d.; Oregon edge grain, 5¼d. and 6¼d.; ceilings, 6 x ½, 3d. per sq. ft.; Oregon, 4 x ¼, 4¼d.; pitch pine, 6s. 6d. per cub. ft.; Oregon, 4s. 9d. per cub. ft.; clear pine, ½ in. x 12 in., 7¼d. per ft.; 1 in. x 12 in., 8d.; teak, small planks, 14s. 9d. per cub. ft.; do., large, 15s. 9d.; jarrah, 8s. 6d. per cub. ft.; poplar, 1 in. x 12 in., 8d.; scantling, 9 x 3, 10½d. per ft.

Bricks, cement, lime, etc.: Cement, nominal, 34s. 6d. per cask; Pretoria Portland, 9s. 3d. per bag; 8s. 3d., truck loads; lime, white, 7s. 6d., truck loads 6s. 6d., slacked; do., 5s.; blue, 3s.; bricks at kiln, stock, 35s.; wire cuts, 40s. to 50s. pressed, 65s. per 1,000, road transport now normal; salt and white glazed bricks, £27 10s per 1,000; tiles, roofing, £17½ square; glazed tiles, 10s.-6d. to 17s. 6d. yard; paving cement tiles, 8s. 6d. yard laid; terra cotta tiles, £15 per 1,000; reinforced concrete columns, 6ft. plain, 21s. 6d.; fluted, 24s.; fireclay bricks, £9½, good average, per 1,000; clay chimney pots, 80s. per doz.; fireclay, 37s. 6d. ton on rail.

Oils, paints, lead, oxides, glass: Linseed, raw, 30s. boiled, 30s. per 5-gall.; white lead, 65s. to 70s. per 100 lbs.; turpentine, 52s. 6d. 2/4 galls.; coal tar, imported, 10s. to 11s. per 5 galls.; oxide in oil, 30s. to 32s. 6d. per 100 lbs.; dry oxide, 21s. to 22s. 6d.; S.A. crude oxide, 12s. 6d.; linseed oil putty, 4s. 6d. per 12½lb. bladders; 30s. casks of 100 lbs.; grease A.F. axle, 23s. 6d. to 25s. per 100 lbs.; tallow, 9d. per lb.; White Rose paraffin, 14s. 6d. 2/5; Laurel do., 14s. 3d.; petrol, 24s. 6d. 2/4; motor oil, 6s. to 7s. 6d. per gallon; lubricating oils, 24s. per case; cylinder, 30s.; paints in tins, 8d. to 9d. per lb., according to quantity, and if ordered to be mixed, 10 per cent. on pre-war rates. British plate-glass, ¼in., 3s. 6d. foot.

Chemicals: Mercury, £17 10s. per 75 lb. bottle; bichromate potash, 1s. 6d. lb.; chlorate, 2s. 6d. lb.; permanganate, 7s. 6d. lb.; alum, 9d. lb.; carbolic acid, 5s. 6d. lb.; borax, 66s. 100 lbs.; cyanide soda, 1s. 4d. lb.; hypo, 1s. lb.; acetate lead, 67s. 6d. 100 lbs.; litharge (assay), 57s. 6d., (commercial) 37s. 6d. 100 lbs.; zinc sheets and blocks, 1s. 3d. lb.; plumbago crucibles, 4½ per number.

Electrical Goods: Lamps, high volts., British, Holland & American, 14s. to 21s. wholesale, and 21s. to 27s. doz. retail; carbon lamps, 7s. 6d. per dozen; pure rubber flex, 9d. to 1s. per yard; 3/20 coils of wire, 27s.; do., 3/22, 23s.; tubing, 12s. to 13s. 100 ft.; keyholders, 2s. 6d. each; round blocks, 5½ in., 1s. doz., local; lamp holder cord grips, 15s. doz.; switches, 5 amp., 12s. to 13s. doz.; British glass shades, 21s. to 36s. doz.; Bohemian shades finished; porcelain shackles, 14s. 6d. doz.; do., bobbins, 15s. to 16s. 6d. 100; cleats, 18s. per 100; P.O. insulators, 18s.; motors, 3 h.p., about £30 new.

The friends of Captain Clem D. Webb, now in East Africa, will be glad to hear that his eldest son, W. Stuart D. Webb, formerly of the I.L.H., has been gazetted to a commission in the Border Regiment.

A Small Electric Motor.

Ivan T. Nedland, of Hillsboro, N.D., has completed a tiny electric motor, said to be the smallest in the world, which weighs but 5½ grains, complete. This tiny machine is finished in gold and will run at a high speed when connected to a small flashlight battery. The commutator has four segments made of gold, each segment being insulated with mica. Fibre is used as insulation between the commutator and the shaft; also between the end pieces and the commutator. The commutator is built up in the same way as in any other motor, no glue or cement having been used in its construction. The diameter of the commutator is 45 1,000in., and it is mounted on a pivot steel shaft, 9 1,000in. in diameter. The armature has four poles and is wound with No. 40 silk covered wire. The diameter of the armature is 90 1,000in. The weight of the shaft, commutator and armature wound complete is 1¼ grains. The motor has two field coils between the armature and yoke. The brushes are made of silver and are 12 1,000in. in diameter, and the springs for the brushes are 4-1,000in. in diameter. The length of the motor over all is 13-64in. and height 11-64in.

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THE WEEK IN THE SHAREMARKET.

Stronger and More Active—Springs the Feature—Far East Stocks in Favour.

Far East Rand shares, led by Springs, continue to be the feature of the market. Springs provided the chief counter of the week on the news of continued good development, and they were dealt in to considerable numbers. Daggafonteins were also firmer, and all the low-priced Far East shares are being steadily purchased and locked up against the day when the district comes into its own. A feature of recent buying is the discrimination being shown. Many stocks are hardly dealt in, and buying is chiefly directed to Far Easterns of promise, or to the older, Central Rand mines that have good dividend prospects. Of the latter, City Deeps and Wolhuters appear to be the favourites. The West Rand district seems entirely to have lost interest for the market, and the investment attractions of the big amalgamations do not appear to find much favour. With the labour supply still excellent, the general outlook, however, is most satisfactory.

	Friday. 3rd.		Sat. 4th.		Mon. 6th.		Tues. 7th.		Wed. 8th.		Thurs. 9th.	
African Farms	8	3*	8	7	8	6	8	5*	8	5†	8	5
Apex Mines	5	3*	5	6*	5	9	6	0†	5	3*	5	3*
Aurora Wests	—		10	0*	10	0†	10	0*	10	0*	10	0*
Bantjes Cons.	12	9	12	6*	12	10½	12	9	12	10*	13	0
Brakpan Mines	70	0*	70	6*	70	6*	70	6*	72	0†	70	0*
Breyten Collieries	19	0*	—		—		19	0*	—		—	
Brick and Potteries	5	0*	—		—		—		5	0*	5	0*
Bushveld Tins	0	7*	0	9†	0	9†	0	6*	0	6*	0	6*
Cassel Coals	—		—		—		—		20	0*	20	0*
Cinderella Cons.	5	6*	5	9*	—		—		5	6*	5	6*
City and Suburbans.	33	6*	34	6*	35	0	35	0	35	0A	34	6*
City Deeps	72	6*	73	0	73	0*	71	6*	71	9*	72	0*
Cloverfied Mines	—		7	3*	7	6	7	6*	7	6*	7	6
Cydesdale Colls.	14	0*	14	0*	14	0*	14	6*	15	0*	—	
Concrete Construction	—		—		—		2	0*	—		—	
Con. Langlaagtes.	30	0*	31	3†	31	0†	31	0*	—		31	0†
Con. Main Reefs	18	3*	18	6	18	6*	18	6*	18	6*	18	9
Con. Mines Selection	14	0*	15	0*	—		—		—		15	3*
Coronation Colls.	27	6*	30	0†	30	0†	28	6*	28	0*	28	0*
Coronation Freeholds	0	5*	0	5*	0	5*	0	3*	0	5	0	3*
Crown Diamonds	2	0*	2	0*	2	0*	—		2	0*	2	3*
Coronation Synd.	2	0*	—		—		2	0*	—		—	
Crown Mines Deb.	£95*		—		£95*		£95*		£95*		£95*	
East Rand Coals	2	10*	3	0	3	1	3	3	3	6	3	1*
East Rand Centrals	5	2	5	6	5	8	5	9	5	9	6	0
East Rand Deeps	1	6*	1	6*	1	6*	1	6*	1	6*	1	6*
East Rand Minings	10	6*	10	0*	11	0	10	6*	10	6*	11	6
East Rand Props.	16	9	16	9*	16	9*	16	9*	16	9*	17	0
East Rand Debs.	£77½*		£77½*		£77½*		£77½*		£77½*		£77½*	
Eastern Golds	1	3*	1	3*	1	4*	1	4*	1	4*	1	6*
Frank Smith Dmds.	2	2*	2	4*	2	4*	2	4*	2	0*	2	6
Geduld Props.	35	6	36	0	36	0	36	6A	36	9	36	9
Glencairns	—		—		2	0*	—		2	0*	—	
Glencoe Collieries	—		—		—		—		6	9†	—	
Glynn's Lydenburgs	10	6*	11	0*	10	6*	11	0*	11	0*	10	6*
Govt. Areas	32	0	33	6	33	0	33	0	33	0	34	6
Jupiters	7	0*	—		7	3*	7	3*	7	3	7	0
Klerksdorp. Props.	1	9*	1	9*	1	9*	1	9*	1	9*		
Knight Centrals	18	3	17	7	17	10	17	9	17	1	16	7
Knights Deeps	—		22	6†	—		—		20	0*	22	6†
Lace Props.	4	6	4	9	5	0	—		5	4	7	0
Luipaardsvlei Estate.	6	9	—		6	3*	6	9	—		6	6*
Lydenburg Farms	9	2	9	3*	9	1*	9	0*	9	2†	8	9
Main Reef Wests	8	9*	8	6*	8	7*	8	6*	8	8*	8	8
Meyer and Charltons	102	6*	102	6*	102	6*	102	6*	102	6*	102	6*
Middelvlei Estates	1	3*	1	3*	1	3*	1	6†	1	4*	1	3*
Modder B.'s	113	0*	111	6*	112	6	113	0	115	0B	114	6
Modder Deeps	—		—		113	0*	112	0*	112	6*	113	6
Natal Navig. Colls.	17	0†	17	0†	17	0†	17	0†	—		17	0†
New Boksburgs	1	1*	1	5*	1	5*	1	5*	1	6*	1	5*
New Eland Dwds.	12	6†	11	0*	12	6†	12	6†	11	0*	11	0*
New Era Cons.	7	7*	7	7	7	7*	7	7*	7	7*	7	9
New Geduld Deeps	3	9*	3	10	3	9	3	9	3	9*	3	10*
New Heriots	—		54	0	53	0*	—		—		55	0†
New Kleinfonteins	28	3	28	3	28	6	28	6	28	6*	29	0
New Modderfonteins	310	0*	—		315	0†	315	0B	310	0†	—	
New Rietfonteins	—		0	9*	—		—		—		—	
New Unifieds	11	0*	—		12	0	—		—		11	0*
Nigels	8	0*	7	0*	7	6	7	6†	7	6†	7	6†
Nourse Mines	15	0*	15	0*	15	0*	15	0*	15	0*	15	0*
Pretoria Cements	64	0	63	0	63	0*	62	6*	64	0	64	0*
Princess Estates	4	0†	4	0†	4	0†	4	0†	—		4	0†
Rand Collieries	3	0*	3	0*	3	0*	3	3*	3	0*	3	6*
Rand Klips	—		6	4*	6	4*	6	4	6	7	6	10
Rand Nuceus	1	10*	1	9*	1	10*	1	9*	1	10*	1	10
Randfontein Deeps	3	6*	3	9	3	8	3	7*	3	7*	3	9
Randfontein Estates	10	9*	10	6*	10	6*	11	0*	11	0*	11	3*
Roberts Victors	9	0*	9	0*	9	0*	8	6*	9	0*	8	6*
Rooibergs	12	6*	12	9*	12	9*	12	9*	12	6*	12	6*
Roodepoort Uniteds	7	0*	7	9*	7	9*	8	0	7	9*	7	9*
Ryan Nigels	2	0*	—		2	1*	2	3*	—		—	
Robinson Deeps	—		—		23	0†	—		—		—	
Shebas	1	9*	—		2	0*	—		2	0*	2	6†
Simmer Deeps	2	0*	—		2	0*	2	0*	2	6†	2	0*
S.A. Breweries	—		—		—		—		27	6*	27	6*
S.A. Lands	3	8*	3	9*	3	9*	3	9*	3	10	3	11*
Springs Mines	49	0	49	9	49	0	49	9	53	0	54	6*
Sub-Nigels	11	6*	11	6*	11	6*	11	6*	11	6*	11	6*
Swaziland Tins	20	0*	22	6*	20	0*	22	6*	22	6*	23	0*
Trans. Coal Trusts	55	3*	56	9	56	3	56	0	57	0*	58	0*
Trans. Lands	13	0*	13	0*	—		15	0†	15	0†	15	0†
Trans. G.M. Estates	—		21	0*	—		22	6*	19	0*	—	
Tudors	—		2	0†	—		2	0†	2	0†	2	0†
Van Dyks	—		3	3†	3	3†	—		3	3†	3	3†
Van Ryn Deeps	59	6*	59	6*	59	6	59	6*	59	6	60	3
Van Ryn Estates	—		42	6*	42	6	42	6*	42	6*	42	6*
Village Deeps	33	6†	32	6†	32	6	33	6†	32	6*	33	6†
Village Main Reefs	20	6†	20	6†	20	6†	20	6†	20	0†	—	
Vogel Con. Deeps	1	9*	2	0†	1	8*	1	8*	1	8*	1	9†
Welgedachts	—		—		18	6†	—		18	6†	18	6†
Western Rand Est.	1	1*	1	0*	1	1*	1	1*	1	1*	1	1*
Witbank Collieries	—		—		—		—		41	0†	—	
Wit. Deeps	23	3*	23	0*	23	6*	23	6	23	3*	23	6
Wolhuters	10	4*	—		10	5*	10	6	10	6*	10	6*
Zaaiplaats Tins	12	0*	11	6	12	0	12	0	12	0*	11	6*

* Buyers. † Sellers. A Odd lots.

ANSWERS TO CORRESPONDENTS.

All inquiries addressed to the Editor must bear the writer's name and full address. We cannot reply to inquiries by letter, but telegrams with replies prepaid will be answered. Correspondents are requested to write their names and pseudonyms distinctly.

"G. R."—The annual report should be out in a few weeks. The annual meeting is in May, when the whole position will, doubtless, be made plain down to date. It is manifestly too early yet to say what, if any, dividend will be paid in June.

"K. C."—The annual report has been completed and sent to London, where it will be issued simultaneously with its appearance here.

"Klip."—The reason for the rise is the increase in the value of "the goodwill." Your other questions are answered in the article in this issue.

"Dividend." (Delmore).—Certainly, you can take them with you and draw the dividends direct, by notifying the secretary of your change of address.

"S. W." (Bedford, C.P.).—Yes. Fair and improving prospects. Should rise in price with any general movement of the market.

"Lucretius" (Kroonstad).—(1) Outlook none too good. (2) Any of the Modder group of mines, or their neighbours. (3) There is no reason why they should.

"N. Z." (Randfontein).—The back numbers are available. Mr. Bosqui's paper began to appear in the issue of June 19, 1915. The discussion is not yet closed.

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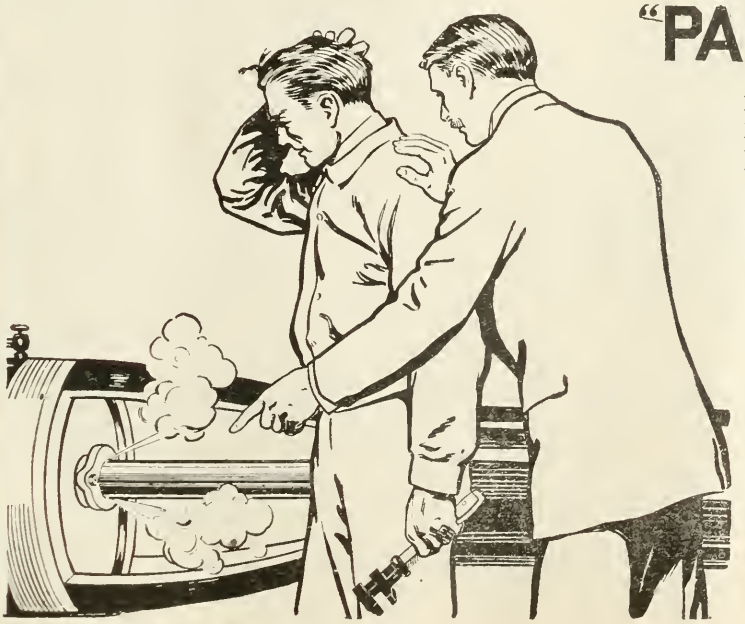

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Engineering Notes and News.

THE DISTRIBUTION PLANT OF THE JOHANNESBURG MUNICIPAL ELECTRIC SUPPLY SYSTEM.—IV.

A Vast Municipal Area—Domestic, Industrial and Lighting Arrangements—Interesting Technical Description.*

[By J. H. Dobson, M.Sc., M.Eng., M.I.M.E., M.I.E.E., A.M.Inst.C.E.]

(d) Replacement of Certain of the Iron Kiosks by Brick Transformer Houses.—Similar designs of brick transformer houses have been erected in places where the growth of the load has been such as to render the old type of iron kiosk impossible from the point of view of size and safety, and in all suburbs which have been given electric supply for the first time since 1909. Examples of such are to be seen in Vrededorp, Newtown, Brixton, Regents Park, Oxford Road, Parktown, Mayfair North, Loch Avenue, Norwood, Parktown North and Richmond.

(e) The Installation of Proper Control Gear in all Transformer Kiosks.—In all places where the original iron transformer kiosks remain the unsatisfactory internal arrangements have been entirely discarded and replaced by high-tension oil switches and fuses on the transformers and on the outgoing high-tension cables attached to suitable busbars; also by suitable switches, fuses and busbars on the low-tension side.

(f) Minor Re-arrangements.—Other re-arrangements of a minor nature consist of: The removal of all cast-iron joint boxes on high-tension cables and substituting therefor proper sleeve joints; the splitting up of the high-tension cables into lengths of about ¼ mile by means of disconnecting boxes and pillars; the relaying of certain high-tension cables previously laid side by side in the same trough, when such cables are depended upon as duplicates to each other; the splitting up of low-tension underground mains by the introduction of additional disconnecting boxes and pillars; the splitting up of low-tension overhead mains by means of suitable switches, mounted on the poles; and the running of loop mains for interconnection between low-tension mains. *Newtown Supply.*—Newtown was at one time an insanitary area, and has been developed by the Council into its present position of being an industrial portion of the town. The amount of motive power required for industrial purposes led to the adoption by the author of a special three-phase four-wire system. The supply is obtained from the Council's two-phase high-tension mains at 3,300 volts per phase through two transformers connected up according to the "Scott" method of obtaining two to three phase. For obvious reasons the transformers chosen are of a type exactly similar to those in use on the rest of the distribution system; in fact, are interchangeable therewith, as all single-phase transformers purchased in recent years have had the additional "Scott" tap on the low-tension side. Thus it became possible to keep the lighting supply to Newtown in line with all other suburbs having an alternating current supply, namely, three-wire, single-phase at 200 and 400 volts, and at the same time a three phase 400 volt supply for motors. This enables the best type of alternating current motor to be used, and has given general satisfaction. *General Remarks.*—The alterations which have been carried out represent work which has been spread over four years, and a large amount of work still remains to be done, especially with regard to pressure regulation. The rapidly changing and growing demands make changes necessary from time to time, as arrangements which might be satisfactory at the time of writing might be totally inadequate a year or two hence.

APPENDIX TO SECTION II.

Sub-Stations.

Jeppestown Sub-Station.—There are three two-phase feeders so connected that any one two-phase feeder can be put on to the high-tension traction bars or to the high-tension lighting bars by means of special links, which, with the links on the inter-connecting side of the feeders, also serve the purpose of isolating the high-tension switches for attention or repairs. The isolating links on the busbar side of the high-tension switches are so arranged that the high-tension traction and lighting busbars may be connected for parellel work whenever necessary. The three outgoing single phase feeders can be connected to either phase A or phase B, and are run to: (1) Belgravia (including Malvern, Cleveland and Denver); (2) Kensington; (3) Troyeville and Bezuidenhout Valley South. The low-tension lighting switchboard is arranged for working either two-phase three wire or single-phase three wire, a pair of links being placed on the main busbars for this purpose. The load dealt with at the present time totals 600 k.w. on Saturday evenings, and is dealt with by two sets of four 100 k.w. transformers, one set on each phase. This allows for one complete spare unit on each side. Each transformer has separate control on both the high and low-tension sides, and thus the number of transformers in circuit at any one time can be arranged to suit the demand. The day load at the present time varies from 100 k.w. upwards, according to the state of the weather, and the present number and arrangement of transformers were chosen after careful consideration of the fluctuating demand, so as to give the greatest reliability in working, coupled with the minimum of core losses. The number of low-tension outgoing feeders dealt with is seven, but provision has been made on the low-tension switchboard for three additional feeders. The traction supply is obtained from the two-phase high-tension supply through two 500 k.w. Westinghouse Rotary Converters, which are separately described in this paper. On the high-tension side the rotaries are controlled from separate cells provided on the high-tension switchboard, and on the low-tension direct current side the usual traction switchgear is provided. Direct current for the overhead tramway trolley wires in Troyeville, Kensington, Bezuidenhout Valley, Jeppestown and Malvern is obtained from the four-feeder panels which are fitted with apparatus similar to the traction feeder panels at the central station. Provision has been made in the traction feeder pillars in the vicinity of the sub-station to quickly change over to the central station in case of a complete failure of the converting plant.

Zoo Sub Station.—This sub-station has been running since early in July and has been put down primarily to deal with the exceptionally heavy Sunday and holiday traffic experienced on the Zoo section of the tramways. The general arrangement, type and size of plant installed is exactly similar to that in the Jeppes sub-station, namely, two Westinghouse 500 k.w. Rotary Converters supplied from a two-phase high-tension feeder direct from the central station, with necessary high and low-tension switchgear, etc., on the alternating current and direct current sides. This two-phase high-tension feeder is to be looped in at the transformer house at the corner of Loch Avenue and Old Pretoria Road, and thus will be available as a standby to the Parktown and Auckland Park lighting system. The Council recently decided to give electric supply to Rosebank and Parktown North, and the necessary high-tension control gear to give this supply has been mounted in this sub-station. In case of total failure of the converting plant, arrangements are made with a change-over switch connected to the traction busbars to draw the traction direct current supply from the central station.

Yeoville Sub-Station.—The erection of a portion of this sub-station is in hand, and the traction plant will be in operation early in 1916. At the present time only the traction portion of the sub-station is being erected, and will be an exact duplicate of the traction portion of the Jeppes sub-station, both as regards the type and size of the plant installed. Provision has been made in the design of the building for an extension, in which it is proposed to instal the necessary transformers and control gear for the centralisation of the lighting of Yeoville and Bellevue. It is proposed to copy the Jeppes sub-station arrangements, the load to be dealt with being exactly similar. A special two-phase high-tension feeder has been run from the central station for the high-tension supply to the converters, and as a duplicate to this cable the two single-phase high-tension lighting feeders going to Bellevue and Yeoville will be tapped into the sub-station and permanently kept as two-phase at the main station. It will be impossible to utilise the central station direct current supply as a standby.

SECTION III.

Distribution System for Power Supply to the Tramways.

Of tramway routes there were approximately 27 route miles and 45 track miles at the end of 1908, and extensions up to date make a total of 49.29 route miles and 66.17 track miles. With the exception of bonding, and the rails being used as the return circuit, the question of track work forms no part of this paper. The system of distribution as originally installed consisted of main feeder cables attached to the busbars at the power station, terminating in feeder pillars on the tramway system, from which connections are made to the line tap cables and thence to the overhead equipment. In the centre of the town, where the traffic is greatest, there is generally only one feeding place in each section, which is approximately one mile in length. In other places more remote from the centre of the town, the sections of which are longer than one-mile lengths, there are two or more tappings from the feeder cable to equalise the potential over the section. The feeder cables are run underground to about two miles from the centre of the town, after which the feeders are run overhead on the tramway poles. The various sec-

* Paper read before the S.A.I.E.E.

tions of the overhead equipment served by the different feeders are separated from each other by means of section insulators, and the feeding points are generally in the centre of each section, at which points the sections are divided into two parts and separated also by section insulators. In this manner the overhead equipment is split up into half-mile sections. The overhead equipment consists of 7 miles of centre pole construction, 15 miles of side pole, and 20 miles of span wire construction. The tramway poles generally consist of 800 lb. poles for centre poles and short arm single track side poles; 1,000 lb. poles for span wire and long arm double track side poles; 1,200 lb. poles for curves and layouts. All poles are of the all-steel variety in three sections, and swaged telescopic joints. The overhead copper wire through which the current is fed to the tramcars is the largest used for such a purpose, viz., 0000 section. The insulation of the overhead equipment originally consisted of the ordinary compressed asbestos-fibre insulation in the form of Brooklyn strains, Globe strains and Line Pins.

Details of the Original Feeder Cable System, Insulation and Protection of the Overhead Equipment.—The feeder cables vary in size from from .2 sq. in. to .6 sq. in. and are of the single conductor leadless type, bitumen insulated with a layer of paper next to the copper with jute serving on the outside of the bitumen. They were unarmoured but laid in earthenware troughs, the whole trough being filled in solid with bitumen with bricks placed on top of the troughs. Wherever possible two or more feeder cables were run in the same trough, and the joints in the feeder cables were the ordinary joints, but surrounded by cast iron boxes, which were filled in with an insulating bitumen compound. A system of departmental traction telephones was installed between the main feeder points and the power station, the telephone receivers being situated in the feeder pillars. The telephone cables connecting the feeder pillars and the power station consisted of simple lead-covered unarmoured cables, and were laid in the same troughing which carried the feeder cables. The lead sheathing of the telephone cables was earthed at the station end and at all the cast-iron joint boxes. The "line taps" connecting the ends of the feeder cables with the trolley wires were connected through fuses to simple lead-covered cables run through and consequently touching the tramway poles. Lightning arresters and choking coils were placed in each feeder pillar to protect the underground cables from the effects of lightning pressures superimposed on the overhead equipment. There was no arrangement of switches which enabled a section insulator to be short-circuited so that the feeding of a section could be done through the trolley wire from another section; when such a method of feeding became necessary through a breakdown on a main feeder the section insulators had to be "jumped" by fastening a length of wire across them, a process which could only be carried out with the aid of a tower wagon. Wherever overhead wires are connected to underground cables, the superimposed electric pressures due to atmospheric disturbances should be made to pass to earth through paths other than through the insulation of the system. For this reason the method of laying leadless tramway feeders on the solid system is the best and safest system, because the path to earth from the copper cable through the bitumen insulation of the cable and through the bitumen in the troughs and the trough itself is a comparatively long one. In the system just described, what was undoubtedly the best system of cables for a traction system was utterly spoilt by the fact that a continuous "earth" was placed in all earthenware troughs by the presence of the earthed telephone cables. Likewise the lead-covered line taps were places of evident danger for attack by superimposed electric pressures, and the lightning arresters, as installed in the pillar boxes gave practically no protection. The phenomenal storms experienced in Johannesburg quickly found out the weak spots of the system; in the first place, the insulation between the copper cable and the earthed lead sheathing of the telephone cables broke down, and in a very short time the telephone cable system became alive and was rendered useless under the pressure of 500 to 600 volts; secondly, the traction cables broke down and became electrically connected to the earthed lead sheating of the telephone cables, and as there were two or more cables in a trough, long stoppages of tramways resulted; and finally, the line taps were pierced at the contacts of the lead sheathing on the poles.

Necessary Modifications.—To bring speedy relief to the system from such troubles, all the paths to earth were removed, the bonding of the lead sheathing of the telephone cables was cut away from all the feeder pillars and tramway rails, and also at the power station and; but there were still left the bondings of the telephone cable at all the cast-iron joint boxes in the feeder cables. During times of repair to feeder cables, the cast-iron joint boxes were removed whenever they were encountered, and the telephone cables, having been rendered useless, were pulled out. All the lead-covered "line taps" were removed and only insulated cable without metallic sheathing used for this purpose. A system of lightning arresters of the British Westinghouse type was installed on the top of the overhead equipment itself at important corners and at every quarter-mile, the connections to which were made in the same plane as the lines of the overhead equipment, so as to give a path to earth as straight as possible. The whole of the insulation of the overhead equipment was improved by the installation of special porcelain insulators, which have stood up well against the severest electrical storms. Arrangements have also been made to disconnect the line taps by means of switches, and the ends of the section insulators have been taken to special switch boxes mounted on the poles within easy reach, so that the section insulators can be quickly short-circuited and one section fed from another section in case of breakdown on a main feeder. Wherever two or more feeders pass a feeding point, a system of inter-linking the feeders themselves has been carried out. Further, the general arrangement of several of the main feeders has been entirely altered so as to confine the area of a stoppage to a minimum. As an instance of this, the Wolhuter section was originally fed from Main Street, and in consequence a stoppage on that relatively unimportant section entailed also a stoppage in Main Street and thus all the trams of the eastern suburbs (Malvern, Troyeville, Fairview, etc.) were shut down until the fault had been located and repaired. Whereas previously the tramway service was interrupted in some portion or other during every storm, the above work, together with careful choice of the positions of lightning arresters, has resulted in almost total elimination of interruptions due to lightning: in fact, there is no record of any interruption during the storm periods for the last two years.

Overhead Equipment It should be stated that the original installation was of round section copper, with soldered ears, etc. A special type of non fouling equipment was tried a few years ago which reduced the amount of labour in construction and was supposed to have the advantage of sweeter running. The experience in practice fully bears out the advantage of the system: but after a short time, owing to the variation of the stress over the varying section of the copper of the non-fouling equipment, it crystallizes and breaks suddenly without any warning, and before the copper is sufficiently worn to justify its replacement. For this reason the use of this non-fouling equipment is now regarded as treacherous and has been discontinued.

(To be continued.)

The Engineering Standards Committee.

The Engineering Standards Committee has just issued the interim report on revised standard dimensions for the threads of sparking plugs. The full report, which will include the manufacturing of tolerances permissible on the threads of sparking plugs and the necessary allowances to be made on the taps used for cutting the internal threads to secure the proper fitting of the plugs in the holes, together with the standard overall dimensions of the sparking plug bodies, is in the course of preparation. The British Standard Specifications for (1) wall plugs and sockets, 5 ampère two-pin, without earthing connection, and (2) the charging plug and socket for vehicles propelled by electric secondary batteries, have also been issued. The former is report No. 73 and the latter report No 74. The specification for domestic wall plugs and sockets relates to the 5-ampère type and for pressures not exceeding 250 volts. In view of their extended use, interchangeability is of the greatest importance, and the Committee has therefore given this aspect of the question the closest attention. In consultation with the manufacturers, the dimensions necessary to obtain interchangeability have been agreed upon, the actual design of the plug being interfered with as little as possible. It is of interest to note that the standard plug is required to have side entry for flexible wire and a suitable hand shield. With regard to the other report, in conjunction with the Electric Vehicle Committee of the Incorporated Municipal Electrical Association, the Committee has standardised the essential details necessary to secure interchangeability between any charging plug and any socket of the design selected by the Electric Vehicle Committee. The way is therefore left open for invention and progress should at any time another type of charging plug be introduced.

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